THE ELECTRICAL WORLD

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## STRIKE OF TELEGRAPH OPERATORS.

The rumors of dissatisfaction among telegraph operators which have been rife in the public journals for several months, but particularly during the past week, culminated on Thursday last, July 19, in a general strike. At the time THE ELECTRICAL WORLD went to press—Thursday afternoon—the strike had just begun, and it is, of course, too early yet to predict how the contest will go.

The signal for the strike was a whistle. At 12:10 P. M. it was given in the main office of the Western Union in this city by Mr. Frank Phillips. Instantly the operators stood up and uttered deafening cheers. Throughout the building, and even outside, the excitement was intense. The afternoon papers all issued extra editions, which were eagerly purchased. The operators of the other companies also struck at the same instant. Dispatches had been sent during the forenoon to the members of the Brotherhood in the principal cities to be ready for the signal. The final message, "We are going," was flashed over the wires, and from Chicago, St. Louis, Cincinnati, Boston, Philadelphia and Baltimore came the answer, "All right. We are going with you. Circuits are open."

The number of operators who left the Western Union office in this city is said to be 400. The officers, however, fully expected the strike, and about 40 new hands, who were held in readiness, immediately took the place of the strikers.

Three lady operators who were not aware that the strike would take place were overcome by the sudden and intense excitement and fainted, falling from their chairs. No demonstrations of any kind were made by any of the strikers. They passed out of the building quietly and gentlemanly and congregated in a body on the sidewalk. They then repaired to the Caledonian Hall, near Eighth avenue, Thirteenth street, and there held a meeting.

In the American Rapid office all the men except half a dozen went out.

In Washington seven men of the Western Union day force stopped work, and it was thought that more would follow.

Only six operators were left in the Baltimore Western Union office, while in the Baltimore & Ohio main office thirty-odd left, only one, a youth, remaining. From the Rapid office nine operators left, leaving only a few female operators.

In Boston all the operators except two struck. The ladies also went out, only four being left out of twenty-five.

The strike occurred at 11:30 at Cincinnati. The signal there was three raps on the desk. On hearing this all the members of the Brotherhood immediately left their desks. Only about a dozen of the working force remained.

A telegram from Philadelphia says that the strike is general in that city.

The talk of a general strike among telegraph operators has been the chief topic of interest during the past week. Never before did the public realize how dependent it was upon the electric nerves of the country. The possibility of the telegraphic wires which cobweb the land from shore to shore and stretch their vital threads under the sea being silenced even for a week has startled the people everywhere. As usual in such a crisis, opinions are more numerous and diverse than the insects and all other plagues of summer; each person has something to say about causes, results, rights, and duties, while few really know much about any phase of the situation. The press has uttered itself on this subject from so many standpoints and to such different ends that the universal mind is badly unsettled.

Rumors of a concerted demand by the operators for higher salaries and fewer hours of labor have been afloat in the public journals for some time. They were merely the cool breeze which precedes the storm. Definite action, however, was taken on Monday, July 16, when the Executive Board of the Brotherhood of Telegraphers presented copies of their memorial, asking certain concessions, to the executive officers of the Great Northwestern Telegraph Company of Canada, the Baltimore and Ohio Telegraph Company, the Western Union, the American Rapid, American District and several minor companies. The following is the memorial presented to the Western Union, which only differs from that submitted to the other companies, in containing the Wheatstone clause, the Wheatstone system not being used in this country by any company but the Western Union:

THE MEMORIAL.

CENTRAL OFFICE, BROTHERHOOD OF TELEGRAPHERS OF THE UNITED STATES AND CANADA.

*Thos. T. Eckert, Esq., General Manager and Acting President of the Western Union Telegraph Company, New York City.*

SIR: The undersigned, the Executive Board of the Brotherhood of Telegraphers of the United States and Canada, acting in accordance with instructions from that body, respectfully petition your favorable consideration of the following memorial, embodying the desires of all classes of employés in the service of the Western Union Telegraph Company:

SECTION 1. Believing that man's physical and mental welfare requires that at least one day in seven be accorded him for rest and recreation, we request the total abolition of Sunday work as a compulsory duty, unless compensated as extra service.

SEC. 2. That eight hours shall constitute a day's work and seven hours a night's work.

SEC. 3. Both sexes shall receive equal pay for equal work.

SEC. 4. That a universal increase of fifteen per cent. on all salaries now paid be granted.

LINEMEN'S INTERESTS.

SECTION 1. That eight hours shall constitute a regular day's work, and that compensation at the rate of two days' pay be allowed for all Sunday work. That the lowest salary paid a regular lineman shall be $65 per month and for helpers $50. That the duties of linemen be confined solely to their legitimate work.

WHEATSTONE INTERESTS.

SECTION 1. That the salaries of first-class Wheatstone operators be increased to $75 per month and second-class operators to $60 per month, and that they receive in addition the 15 per cent. increase asked for Morse operators.

SEC. 2. That the working hours of Wheatstone operators be the same as Morse operators.

A reply at the earliest possible moment solicited. Very respectfully.

EUGENE J. O'CONNOR, Chairman. HARRY W. ORR,
MORTIMER D. SHAW, Secretary. ROGER J. MULLEN,
JOSEPH H. FORD, JOHN CAMPBELL,
ROBERT EWING, Executive Board.

Manhattan Hotel, corner Broadway and Canal street, New York City, Monday, July 16, 1883.

The Western Union is the most formidable opponent the operators have to cope with. Its scale of salaries is in a measure the criterion for many of the minor companies. It employs about 15,000 operators and many linemen, and its dictum goes far toward adjusting all troubles elsewhere. In case of a strike, too, it is the corporation upon which disaster would most severely fall.

The committee was received by General Eckert, who inquired if the gentlemen he addressed were the persons whose names were signed to the memorial. When told that they were, and that they represented twelve thousand telegraph operators in different sections of the country, he affected not to be sure of that fact, asserting that they were strangers to him, and resorted to exasperating though not very brilliant diplomacy by asking for the names of the operators they claimed to represent. The committee, who considered themselves treated in a manner which barely escaped gross discourtesy, retired with courtesy, intimating nothing of the intention in case its requests were not considered: neither did the head and front of the Western Union say what he would do, or whether he would do anything.

This event created the intensest interest in all circles, and the decision of the Western Union was looked for with universal eagerness. General Eckert refused to talk upon the subject with any one, or signify his intentions, but the belief obtained that he would do nothing that resembled a respectful consideration of the petition. After his brief conference with the committee he managed to get his views before the public without answering his petitioners by sending the following telegram to General Superintendent Clowry, at Chicago, which was made public through the Associated Press on the morning of the 18th:

NEW YORK, July 17.

*To R. C. Clowry, General Superintendent Western Union Telegraph Company, Chicago:*

A committee of six persons called upon me yesterday and presented a memorial addressed to the Western Union Telegraph Company and signed by themselves as members of the Executive Committee of the Brotherhood of Telegraphers of the United States and Canada. The memorial calls upon the company for certain concessions in regard to hours and rates of pay, substantially in accordance with the programme with which you have been familiar since their March meeting in Chicago.

The parties were asked if they represented the employés of this company, and upon replying affirmatively, they were requested to furnish a list of such employés. This, they said, they were not able to do, stating that it would require a long time to prepare a list, and that they were here on expense. They were told that the company did not know the committee, or whether its members had authority from the Western Union employés to present any demand, and we could not deal with outside parties. Aside from the questionable manner of presenting such a memorial, one demand is that both sexes shall receive equal pay for equal work, and another for 15 per cent. increase on all salaries.

An operator now receiving a salary of $50 a month would by this plan get a smaller increase than one getting $80 or $90 a month, thus widening the difference now existing. An $80 operator at present works nine hours daily, twenty-six days a month, equal to 34 18-100 cents per hour. Under the schedule in the memorial the same operator will receive $92 per month for eight hours daily, equal to about 30 per cent., in addition to the Sunday allowance just granted under the new rule. This is the smallest increase demanded. In case a Wheatstone operator receives $50 per month for 23 working days, equal to 21 36-100 cents per hour, the proposed schedule would give him 41 46-100 cents per hour, an increase of over 94 per cent. Another demand is that linemen shall be allowed two days' pay for Sunday work, and that $65 shall be the lowest rate of pay, regardless of location or importance of service, and that the duties of linemen shall be confined to legitimate work.

Nothing is said about the duties of other classes being restricted to that particular line of employment, but if such concession were allowed one class there is no reason for withholding it from others, and why linemen should have helpers is not understood. Again, double pay for Sunday work offers temptation to the men to slight their Saturday duty to create a necessity for the Sunday work. The demand that both sexes shall be paid the same for like service looks to the driving of women labor from the ranks, as were the company to concede it, it would be to its interests to prefer men operators who can be availed of for a greater variety of service than women operators who may be equally capable for general duty.

In a published interview with a member of the committee the latter stated that since the organization of the League petty wire troubles and mistakes in messages have practically ceased and that business has been greatly facilitated, these results being attributed directly to the fact of the organization. The reverse is the case. Operators declining to join the League have been interfered with in their duties.

Wires have been thrown out of working condition, and in numerous cases the official business of the officers of the company has been mutilated and seriously delayed. A strike of the American District Telegraph Company's linemen, members of the League, took place in this city recently, since which time the strikers have been engaged in cutting wires daily, one man now being under arrest and indictment for such lawless work. With thousands of able-bodied men out of employment all over the country applying to us for work, such a demand is remarkable. It is known that a large proportion of operators have been led to join the League under compulsion and others under the belief that the organization was co-operative for legitimate and benevolent purposes, many of whom have stated that they will repudiate any arbitrary action of the striking element.

[Signed] THOMAS T. ECKERT, Acting President.

This movement has been growing during the last two years under the ministrations of the Brotherhood, which has a large membership, including the majority of the men in the employ of the Western Union, those in the railroad service and those who work the brokers' wires. They consider themselves well organized, have money in the treasury and the advantages of summer prices for living, and are not dismayed at the prospect of possible idleness. They say that year by year the financial outlook grows darker instead of brighter with all employés of the telegraph companies.

Members of the committee of the Brotherhood said that

if a strike was ordered it would extend to all the offices in the United States and Canada simultaneously, as the Brotherhood had $140,000 in its treasury to be used in assisting operators during a strike.

It was expected that the signal for the strike would be given at twelve o'clock on Wednesday, July 18, and the excitement, especially around the Western Union building, as that hour drew near, was very great, not only among the telegraphers, but also among the general public. Business men interested in important negotiations by wire were extremely nervous during the day, and made anxious inquiries from every uniformed messenger that they happened to see if "that strike" had taken place. At the Produce Exchange, Cotton and Mercantile Exchanges there was a general rush in the early part of the day to send messages. Many dealers in grain and produce added to their telegrams such admonitions to their correspondents as "Reply at once before the wires are shut off." A large proportion of the messages received at the Produce Exchange from Chicago during the forenoon contained similar postscripts. Dealers and brokers who sent orders from here to other cities to buy or sell were careful to limit their orders to five, ten or fifteen minutes, as the case might be. A number of night operators in front of the Western Union building were discussing the situation, and many rumors having no foundation in fact were circulated. One was that the Executive Board of the Brotherhood was to call for an answer to the demands made on Monday, and another was to the effect that the company offered an immediate increase of 10 per cent. in salaries and the promise of 5 per cent. additional in three months, but that this was not satisfactory to the operators, and the strike would take place anyway. When twelve o'clock had passed it was taken for granted that no strike was to be inaugurated that day.

The meeting of the Western Union Executive Committee, which takes place every Wednesday, was looked forward to with much interest. It was expected that everything depended upon the action of this committee. The meeting took place at 12:30 P. M. behind closed doors. With the exception of President Green, who is in Europe, all the members were present—a very unusual circumstance for the summer season. Mr. Gould had come from Newport expressly to attend, ex-Governor Cornell from Long Branch, and Mr. Cyrus W. Field from Tarrytown. The other members of the committee are Messrs. Russell Sage, John T. Terry, John Van Horn and General Eckert. Messrs. J. W. Clendennin and Erastus Wiman, who were present also, are directors, but not members of the Executive Committee. When the meeting adjourned, after a two hours' session, it was learned that the committee had agreed unanimously to ignore the Brotherhood, but had adopted, without a dissenting voice, the following resolution, of which Mr. Gould is said to be the author:

*Resolved*, That a committee, consisting of ex-Governor Cornell, J. W. Clendennin and John T. Terry, be appointed to inquire into complaints of inequalities of compensation or conditions of service of the employés of this company, if any, and report to this committee.

From those who were present at the meeting it was learned that the sentiment was unanimous in support of the action of General Eckert in his reception of the committee who called on him to present the memorial last Monday. His telegram to Colonel Clowry, of Chicago, outlining the position and resources of the company, and calling attention to the exorbitant demands of that committee, was likewise discussed and warmly approved. The meeting did not take cognizance, in fact, of the petition, since it was held that whatever complaints the employés of the company might make must be made directly by themselves to the company's officers.

The sub-committee was not empowered except to make a report next Wednesday, when the full committee meets again. The composition of the committee, however, was of some interest, as bearing on the temper of the meeting and its probable action. Mr. Clendennin, one of the members, is president of the Acadia Coal Company, which has extensive mines in Pictou, N. S. The miners there have been a turbulent community, and have frequently indulged in strikes. Mr. Clendennin has always managed these crises, and has never yielded to demands made through the medium of a strike. Ex-Governor Cornell and Mr. Terry are also said to be opposed to the strike as a means of settling wage difficulties.

After the Executive Committee adjourned, printed slips giving extracts from the constitution and by-laws of the Brotherhood were given to the press. As these are not made public by the Brotherhood, it was evident that the Western Union was in possession of some of the secrets of the organization.

At 9 30 A. M. Thursday morning the following letter was sent to General Eckert:

SIR: On Monday, the 16th instant, a committee of telegraph operators submitted to your consideration a petition intrusted to them for presentation to you by the Brotherhood of Telegraphers. You expressed your doubts as to the authority of that committee to speak for the employés of the company. You have failed to respond to that petition. Your letter to R. C. Clowry, general superintendent, discloses to the public the fact that you were informed of the nature of your employés' grievances before hey were presented. U nder ordinary circumstances it would require but a short time to arrive at a conclusion as to what steps you would take, but knowing as we did that this matter had been thoroughly discussed before we waited on you, it was not unreasonable to expect an early reply. It is due to the interest you represent, to our organization, and particularly to the general public, that the matter be speedily adjusted, and that the responsibility of our future action may rest where it properly belongs. It is with an earnest desire for the harmonious settlement of the difficulty, and regard for the social and business interests of the people that we send this last appeal for the recognition of the rights and redress of the grievances of your employés.

Very respectfully yours,

JOHN CAMPBELL,
District Master Workman.

The sub-committee appointed to inquire into the grievances of the employés met at 11 o'clock, and after issuing instructions to heads of departments to have employés present their grievances, adjourned to meet on Friday morning. The strike, which began, as stated above, at 12 p. m., will probably cause them to change their plans.

A full report of the progress of the strike will be published in the August 1 issue of *The Operator*.

## Small Electric Motors.

Much interest is manifested in small electric motors at the present time, because they appear to afford at least a partial solution of the problem of producing motive power on a small scale. Electricity answers the peculiar requirements essential to a successful solution of this important problem more adequately than any other agent, and this accounts for its marked success. In all cases where small motive power is desirable, economy of space, simplicity of construction, and convenience of operation are important considerations. The electric motor presents the very qualities which render it suitable under these circumstances: It can be made small and compact, so as to occupy a narrow space; it is not complicated in construction,; its operation is simple; it is convenient to manage, and can be easily controlled at will; it is readily adaptable to all kinds of work, and may be shifted from one position to another while in operation. It is these merits which have rendered the electric motor useful of late in several minor industrial and domestic operations where motive power was desirable, but hitherto not obtainable. Electricity did not displace steam, it merely supplemented it by assuming a rôle which the latter never was able to play.

In speaking about electric motors the question of cost and economy always suggests itself as an afterthought that needs a little consideration. From the economic point of view the small electric motor, especially where it is made to derive its energy from batteries, seems a kind of luxury. But the truth is that small motive power is at best very costly, no matter from what source it is derived, and the customer who invests must expect to pay a round price for the convenience. Nevertheless, as compared with small steam engines, small electric motors will, in the majority of cases, show a saving in their favor, because small motive power is still more costly when produced by steam than by electricity; the smaller the steam engine the greater its comparative expense. For producing the motive power sufficient to run a sewing-machine, for instance, the electric motor would undoubtedly be more economical than a steam engine of the same power, while it is incomparably superior and in every way preferable to it, because of its greater convenience and other advantages. In the majority of cases where small motive power is used, these merits are of more importance than the question of economy, and there are many new applications where such is also the case. The demand for small electric motors is constantly increasing and their sphere of usefulness seems to be enlarging more and more. The construction of cheap, simple and efficient electric motors for producing small motive power is well worthy of the attention of electricians, and is likely to prove a promising field to inventors, because there is room for much improvement. The efficiency of our best small electric motors is almost discouragingly low. Some measurements which were lately made showed that the efficiency of the best known small motors did not surpass twenty per cent. in any case. On the other hand, we have several forms of the dynamo-electric machine which when used as motors give a useful return of 95 per cent. Of course, the comparative efficiencies of two machines of different size may be expected to show a difference in favor of the larger machine, but this difference is not, as a rule, so striking. The fact is, our small electric motors are constructed in a manner quite different from the large ones. The armature used is different. In the best dynamos and motors we have ring or cylindrical armatures. In small motors such armatures would undoubtedly be the most efficient, but there are difficulties in the way of construction. Small armatures of this order could not be constructed at all, or at least only at great expense and trouble. To avoid these difficulties a simpler form of armature is adopted at the sacrifice of some efficiency.

The old Siemens armature, known as the H armature

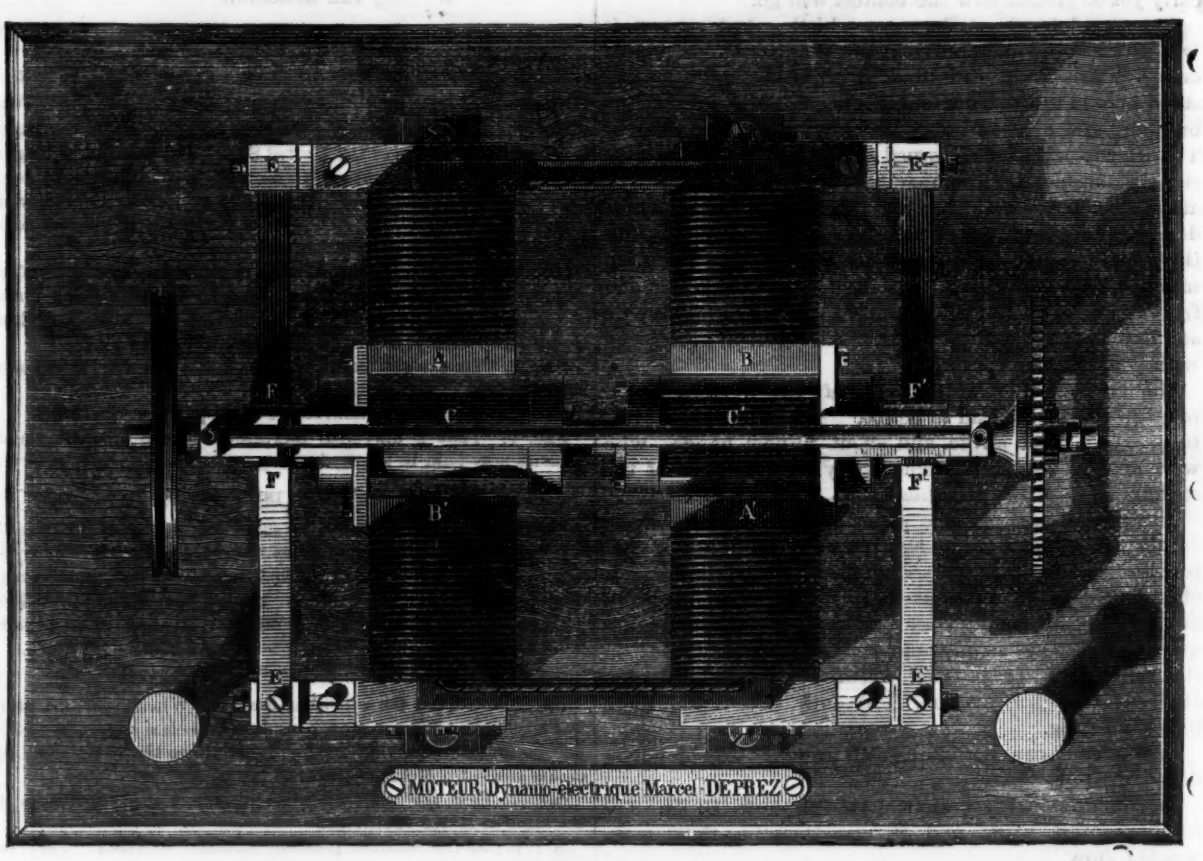


FIG. 1.

because its cross section (*A B*, Fig. 3) recalls that letter somewhat, has come into favor in the construction of small motors. It is employed in the Deprez, the Trouvé and the Griscom motors. These, therefore, are substantially nothing more than small Siemens dynamo-electric machines reversed.

Armatures of the H type are not nearly as efficient as ring or cylindrical armatures. The mutual attraction between the armature poles *A B* (Fig. 3) and the magnetic poles *N S* is not uniform at all parts of the revolution of the armature, because the poles *A B* constantly change in position relatively to the poles *N S*. There are two periods in each revolution during which the mutual attraction is at its maximum, and then two periods gradually ensue during which the action is lowest. There is also a brief period during which little or no current is passing through the armature wire. This happens when the slits of the two commutator segments pass under the brushes and the segments thereby become momentarily short circuited by the brushes. This point of the revolution is equivalent to the dead centre of a steam engine, as the armature receives no current at this point. In ring or cylindrical armatures wound in sections there is no dead centre, and the motor will start itself when stopped at any point, because a section short-circuited out of circuit represents only a small portion of the total wire in the armature. The remainder of the sections are always left in circuit, and the current is never absolutely broken. This advantage is very great in the case of large motors, but in small ones it is not of such material value since the motor may be moved by hand beyond its dead centre, when it fails to start. The H armature has the great advantage of being convenient and cheap to construct, especially when very small armatures are desired; it is compact and easily put in place, and is not likely to give much if any trouble in consequence of continued use. It is for these reasons that it is used so generally in small electric motor

The success of the Trouvé and Griscom motors has led many electricians to experiment with motors of this class with a view to their improvement. Recent experiments of M. Marcel Deprez with small electric motors are full of interest in this connection. He aimed directly at higher efficiency while avoiding complicated construction. He observed the fact that in ordinary motors of the old Siemens type about one-third of the energy expended is consumed in energizing the magnetic field and in maintaining its power. He therefore conceived the idea of using permanent magnets for the magnetic field. He made comparative tests of two machines, in one of which the field magnets were permanent, and by measuring the power obtained and the amount of zinc consumed in the battery he discovered that the efficiency of the motor having permanent magnets was about 60 per cent. higher than that of the other. It is well known that motors and dynamo-electric machines are reversed conditions of the same apparatus. M. Deprez found on using this motor as a dynamo-electric machine that its electrical equivalent for the same power, as used on the other machine, was very much higher. He constructed a small generator on this plan, having an internal resistance of .5 ohm and producing an electromotive force of nearly 20 volts, with a total weight of only 25 kilogrammes (50 lbs.). Such a generator would give a carbon pencil four millimetres in diameter and 50 millimetres (2 inches) long, a bright cherry red glow M. Deprez found that the use of such a magnetic field was attended with difficulties, however. Just as the poles of an armature *A B* (Fig. 3)

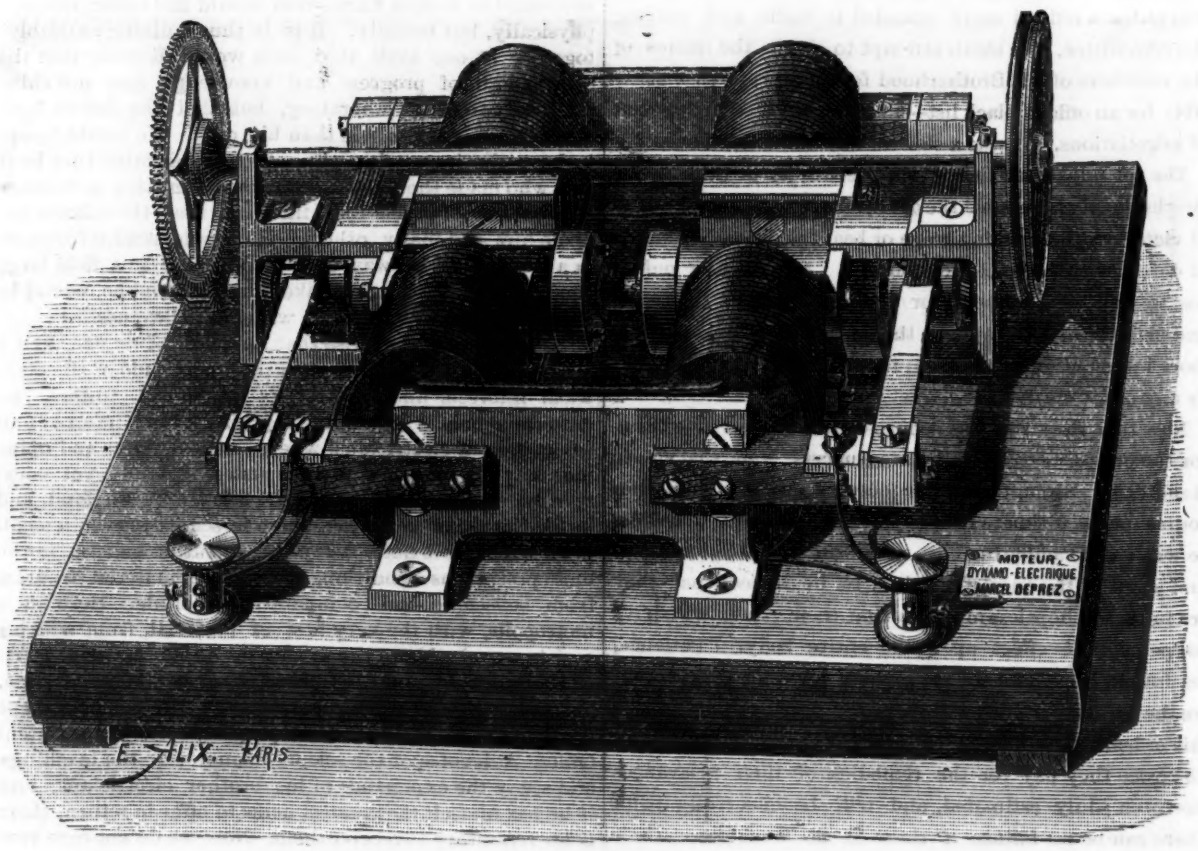


FIG. 2.

move into line with the poles of the magnetic field *N S*, the current is reversed in the armature, and instead of attraction repulsion results. Now, if the current in the armature is too powerful, the magnetism of the armature will be sufficient to neutralize the polarity of the permanent magnets, even when the best magnets are used. The result was that, although the efficiency of the motor was very great at first, the power of the motor soon dwindled down by the weakening of the magnet. Another disadvantage of permanent magnets was that for the same power they must be much larger than electro-magnets. M. Deprez, therefore, concluded to sacrifice economy in favor of convenience to some extent, and returned to electro-magnets, striving to use them to the best advantage.

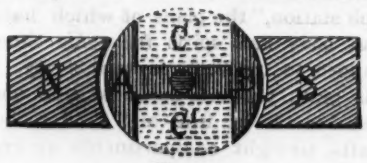


FIG. 3.

Figs. 1 and 2 are *full size* illustrations of a small motor constructed by M. Deprez, which will run a small sewing machine with two Bunsen cells. Two armatures *C C*¹ are mounted on the same shaft, each of which revolves in the magnetic field between the two opposite poles *A B*¹ and *B A*¹ of two U electro-magnets placed opposite each other. These armatures are 16 millimeters in diameter and 20 millimeters long, and are fastened to the shaft with their poles at right angles to each other, so that the dead centre of one corresponds to the active period of the other. The poles of the electro-magnets are joined at each side by a brass framework, which extends outward, and has bearings on which the shaft turns, as will be readily understood from the figures. The brushes *E F E*¹ *F*¹ are supported by small wooden or vulcanite arms attached to the backs of the electro-magnets, which are secured to the base board, as shown, and form the supports for the whole apparatus. These brushes are made long and flexible, so as to provide a light yet smooth and perfect contact with the commutator segments. The speed of the motor is reduced by means of a pinion gearing with a toothed wheel which revolves ten times more slowly than the pinion.

By changing the connections of the electro-magnets and armatures from series to multiple, three different variations of power may be obtained. The change may be made without trouble. The motor is very compact and light. It has no dead centre and the magnets are disposed so as to secure a powerful magnetic field, which must, of necessity, be exactly equal at both armatures.

[TO BE CONTINUED.]

## Electric Lights at the London Fisheries Exhibition.

The preliminary lighting-up of the galleries and courts of the Fisheries Exhibition in London, says the *Times*, demonstrated more completely than has yet been done the capabilities of the electric light for the illumination of the interiors of public buildings. In the even distribution of the lights, the steadiness of the lamps and the absence of patches of shadow, the success of the trial was remarkable, and, well lighted as most of the galleries are by day, their contents have certainly never been seen to such admirable effect as they now appear in the brilliant and diffused radiance of the electric lamps. Every hue in the plumage of the birds, whose feathers are to tempt the salmon or the trout, is brought out in such gay or sober beauty as it may best serve the purpose of the angler to use. The cases in which the coral and pearly treasures of the sea are displayed appear to greater advantage, and will be even more tempting to the eyes of the fair visitors than by day, and for the thousands who have to spend their days at the desk, behind the counter or in the workroom, the great International Fisheries Exhibition need no longer be only a name. The enterprise of the fifteen firms who have lent their lamps and machinery has thus developed the exhibition into a truly popular institution. On how large a scale the experiment has been carried out may be gathered from the facts that the covered portion of the exhibition lighted is seven acres in extent; that the insulation covers twenty-three acres; that over 25 miles of conducting wires are used; that 56 dynamo machines are employed in the generation of electricity; that a capital of £45,000 is represented in the carrying out of the work, and that to drive these machines and supply the light of nearly 4,000 incandescent and 280 arc lamps, equivalent to nearly half a million candles, steam engines of 1,100 indicated horse-power are running. Passing through the vestibule lighted with 350 Woodhouse and Rawson lamps, the British sea fisheries gallery appears under certainly the prettiest effect of electric lighting yet seen in London. One's first idea is that myriads of bright lamps are set in lines of light that converge in the long perspective of the arcade. More exactly one is informed that this charming illumination is produced with 1,040 Swan lights of 20-candle power each, and to which the current is supplied by two Siemens alternating machines. It will interest electricians to know that the leading wires are connected, so that lamps on alternate arches are worked by the same machine; and that by a suitable arrangement of the circuits the lamps are made to glow with equal brilliance in all parts of the gallery without the employment of any regulating apparatus. Messrs. Siemens have also illuminated the great conservatory very successfully with four arc lamps of 5,000-candle power each, and, with regard to these, it is worthy of note that they are connected parallel, and that the Siemens continuous current machine which supplies the current is 420 yards distant. The Newfoundland, Netherlands and Belgian courts are lighted by the Jablochkoff Company with 60 arc lights, worked in three series by three Jablochkoff-Gramme machines, producing alternating currents. In the Swedish and Norwegian courts the lighting is effected with 15 Brockie arc lamps, supplied by a Gramme machine. A remarkably brilliant and steady illumination of the Canadian and United States courts is obtained with 15 Lea arc lamps, driven from three Gramme machines. The Spanish and Russian annexes are to be supplied with 10 Gerard arc lights each, those in the first-named court run by a Siemens direct current machine and the Russian by a Gerard compound Gramme. The long central promenade allotted to the British fresh-water fisheries was lighted with 25 arc lamps of the Hochhausen pattern, worked in series by a continuous current Hochhausen machine absorbing 20-horse power and delivering a current of 10 ampères. The eastern gallery, in which are the collections of China, New South Wales, India, the Straits settlements, Japan, Chili, and France, etc., presents another novelty in fanciful illumination which well suits the more ornate character of the decoration in this building. Some 600 Crookes incandescent lamps are suspended from the arches of the roof, each lamp being covered with a semi-transparent reflector. The current is supplied by two large and one small Gülcher low tension dynamos, the circuits being so arranged that all the lights hung on the odd-number arches are served by one machine, the even-numbered arches from the other, and a line of lights in the space between the arches by the small machines. The dining gallery is illuminated by 28 arc lights on a new system. The pavilion of the Prince of Wales was lighted by 184 Swan lamps, tastefully arranged so as to show the interior to advantage.

## Dissatisfied Telephone Employes.

The telephone climbers, repairers, and instrument men of Chicago, have come to the conclusion that their services are underpaid. On the 16th they made a demand for an increase of twenty-five per cent. in their pay, stating that they would await the decision of the company forty-eight hours.

A committee representing the linemen called on the officers of the telephone company, July 18, for an answer to their bill of grievances. The officers refused to treat with the men as a body, but expressed a willingness to arbitrate individual cases in as satisfactory a manner as possible. This proposition not being accepted, the committee returned and reported to the men, who were waiting near the house, the condition in which affairs stood. It was unanimously decided not to accept the company's mode of settlement, and therefore 64 linemen stopped work. The telephone men who have struck are very bitter in their complaints of their treatment by the company. "I know for a fact," said one of them, "that the company has sent messengers around to the men individually, to try and bribe them to use their influence with their fellow-laborers in preventing a strike. It is all nonsense for the officers to say that they can get all the men they want who can do the work as well as we can. There are only five linemen left working now, and it will take a green hand at least seven months to learn how to do the work that we have been doing. We are confident of bringing the company down to our terms very quick. They have work on their hands now that must be done, and that it will take experienced hands to do properly."

## The Electrical Exhibition at Konigsberg, Prussia.

Since the first of May an electric exhibition has been open at Konigsberg, Prussia. It was not designed to be wide-reaching, but to give the population of a large district an opportunity of becoming familiar with a subject of which, under other circumstances, they must have remained ignorant, as they travel but little. A handsome building has been erected to exhibit the various appliances of electricity for domestic purposes, and most of the fourteen groups into which the exhibits are divided have been placed in special pavilions. The historical and educational group contains, besides others, the very valuable collections of scientific and technical instruments of the university and various institutions of Konigsberg. One section has been assigned to the medical group. A reading-room has been established, to which nearly fifty of the leading publishing firms of Germany have contributed. Batteries, etc., have been supplied by eighteen exhibitors; telegraph apparatus by various firms, and the Eastern Railway, which is under Government management, like most of the important German lines. More than forty dynamos are employed as light machines, besides a number of others for electro-plating, for which fifteen steam and three gas motors are at work. Several hand dynamos are exhibited. A skeleton ship, two hundred feet long and fifty wide, has been built to illustrate the illumination of ships. There is telephonic connection with the Konigsberg opera, and an electric railway.

THE

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## NOTICE.

As many readers of THE OPERATOR will naturally feel anxious for early information regarding the strike, we are sending free, with our compliments, to each of the *Operator* subscribers not on the list of THE ELECTRICAL WORLD a copy of to-day's ELECTRICAL WORLD, containing the latest on subject up to the time of going to press. The *Operator* of August 1 will have a full report of the continuation of the strike.

## THE STRIKE.

What the result of the strike will be, no one can truthfully predict. The Brotherhood is well organized, ably officered and harmoniously conducted. It is not likely that it would inaugurate any movement without having well weighed the chances of failure and concluded that a victory was almost a certainty. The penalty of defeat would be too severe to be lightly risked. This organization contains men of as good discernment and clear brains as can be found anywhere. It is not reasonable to suppose that they would indorse a movement which would result in disaster. In case of victory, the operators will no doubt be as modest as they have been resolute. If a compromise is the result, they will be sure to be as reasonable as they have been faithful. Even if failure overtakes them they will not be completely worsted, since the public at last realize how important a factor they are in the fabric of the country.

As to the wisdom of the strike, they only and not the public can judge, since they only understand the situation and suffered the existing injustice. One feature of their revolt must command the respect of all just minds, and that is the modesty and dignity with which the movement was conducted. No braggadocio or offensive threats characterized it. Indeed, extreme reticence was a special feature. The operators did not herald their grievances abroad, or in any manner ask the sympathy of the public. They did not even talk when questioned and importuned by newspaper reporters. They behaved like men who relied on their own strength and patience, and not upon such poor nourishment as the mouthings of the people. There was no hint of aggressiveness, spite or vengeance in their actions. What they did, let it result as it will, was decorously and decently done. When it became apparent to the Western Union officials that the Brotherhood was about to make some decided move, they sought to anticipate any possible demands by making "concessions" unasked. Accordingly, on the 12th inst., they promulgated an order that "At all independent Western Union offices which may be required to keep open all day Sunday, nine hours actual service in a day, six days in a week, and seven hours actual service at night, seven nights a week, will constitute a day's work. All service in excess of above-named hours, including Sunday, will be regarded extra, and will be paid for at regular salary, on a basis of seven hours to a day."

Although this order did benefit the employés of a few offices, it actually reduced salaries in others, so that the trick was, if possible, a trifle worse than attempting to catch a bird by putting salt on its tail, and its diaphanous character was apparent to every one when they had time to look into it—the new rule practically effecting a saving to the company.

General Eckert's quibble about not knowing whether the committee of the Brotherhood represented the operators was a small and shabby evasion of responsibility, and an open violation of the law of business courtesy, which a manly man ought to be ashamed of. It is not to be supposed that he entertained a fibre of doubt as to the identity of the men who appealed to him, and his demand for a list of the names of the operators the committee represented, was either a refined insult intended to baffle and confuse the committee, or a mean attempt to obtain the names of the members of the Brotherhood for future reference—possibly for an official black list—and to secure a postponement of negotiations. It was a shrewd but undignified move.

The splendid discipline which prevails in the ranks of the Brotherhood will enable the operators to wear the honors of victory with becoming grace or bear the disappointments of defeat with patience and courage. Already the public has an increased respect for the intelligence, character and skill of the telegraphers, the agitation having given it more information in regard to them than was attainable by any other means.

Now that the strike has occurred, there is but one thing for the operators to do to insure success, and that is to stand firm. Strength lies in concerted action. Any other course means ultimate ruin to all. There will doubtless be weak and vacillating ones who will take fright at the first shout of the enemy, but it is to be hoped that they are in such a hopeless minority that their panic will have no perceptible effect upon the entire body. Patience, resolution, hope and the staunchest loyalty to their order are the requisites which will carry the Brotherhood through this ordeal. This step is the result of careful deliberation. The price they pay for the remedies of their grievances has been duly estimated, and will be cheerfully paid. There can be no failure if there is no weakness. Their power is almost absolute, and if judiciously used the field is theirs before many days. In the mean time they must remember that the noise made by the enemy's guns does not always indicate that the battle is going against them. They must expect much thunder from their opponent's artillery; they must be prepared for all manner of stories and reports regarding the actions of strikers in other cities, but the day is theirs if their courage is sufficient.

## Electrical Amicability.

A few months ago a number of prominent French electricians met and enjoyed a right royal dinner, at which they expressed their individual opinions and exchanged views with so much *bonhommie* and *agrément* while drinking each other's health, that rivals in the science forgot they were rivals in everything but the desire to emulate as *bons vivants*. The affair proved such a success that it was voted to make it recur regularly each month, and now the science has the satisfaction of seeing its greatest exponents gathered in pleasant conviviality like the members of one large family. But our Gallic *confrères* did not stop even there. We are informed that the outcome of these dinners is the foundation of the "*Société des Electriciens*," which will formally join all the electricians into a common alliance for mutual advantage and benefit.

The electricians in London have also come to the conclusion that the idea of fraternizing once a month is worth trying, and they have just coined a new name to designate themselves whenever they thus convene to make merry and be joyful, to wit, The "Dynamicables." A queer name, we should think, and one susceptible of ambiguous construction. At first glance it suggests that our English colleagues go in for dynamite, or else that a new cable of the dynamic kind, whatever that may be, is afloat. But after trying different versions it dawns upon the mind that "amicable" is the portentous part of the title. Still there is another enigma. We cannot understand why the prefix should be so "energetic."

It leads one to wonder whether it means that the several "lights" there "exhibited" shine amicably only by dint of *force*, or whether it is simply an expression of that beautiful harmony between the various forms of energy which we designate as the "correlation of forces."

We suggest that it would have been better to borrow the prefix from "dine" instead of "dyne," because the former would more clearly set forth the great aim and purpose of the amicable electricians who convene to discuss a grand dinner.

We wonder now why the next city in size, though not smaller electrically—New York—should not follow such a good example. We certainly would be pleased to see an organization of this kind opening up in our midst, because it might possibly tend to bring about a better understanding and a more cordial feeling between the electricians of the metropolis. There is great need of amicability among the American electricians as a class, many of whom know each other only in rivalry and dispute. They look upon each other with suspicion and distrust. They never meet except by chance, and seldom if ever part as friends. Meanwhile the truth is undeniable that by a little more cordial intercourse with each other they would all be benefited. Each one would learn to respect if not to admire his colleague, and there would not be so many cases of controversy and wrangle in which the one strives to disparage the other to flatter his own conceit, and loses sight of the duty he owes to the science. We think that if the New York electricians would try the experiment which has succeeded so well in Paris, they would feel better, not only physically, but morally. It is in thus "dining amicably" together at one table that each would discover that the electric light of progress and knowledge does not shine forth only from his laboratory, but that the bright light dawns upon other minds than his own. He would be apt to have the impression effaced from his mind that he it was who made the science, and who is making it, because he would in all probability find out that the science has made him and many others. He would realize for once, in a word, that he was only a co-worker in a field large enough for a whole army like himself, and he would be better disposed to harmonize with his colleagues.

It is a matter of surprise that for a city of its size, and a city which is second to none in the magnitude of the electrical interests and enterprises which it fosters, no encouragement is given to anything of the nature of an association of electricians, where scientific ideas and opinions may be advanced and discussed candidly yet courteously, with the greatest benefit to all. In England, and in the European countries, there is scarcely even a small town which does not boast of its scientific society, in the most prosperous condition, even if the material to draw from be scarce and comparatively crude. Here in a metropolis, with the very best of material, from which a society as valuable to the science as any in London, Paris or Berlin could be made, there is no exchange of ideas, and the electrical world never hears of the science except through the inventor, or more properly through the Patent Office. A devotee of the science cannot hear the teachings and study the experience of his brother electricians, and if he has himself the greatest gems to offer in return, there is no repository to receive them. Now we do not care very much how the "revolution" is brought about, but we hope that at no distant day New York can boast of a society of electricians which shall be representative of its best and most talented minds. We suggest the dinner plan, inasmuch as it has been successful abroad, but if it can not be done per "dine," then it might be done per "dyne,"—just enough thereof to break the ice of indifference, for we believe that nothing more lies in the way.

## A Colossal Scheme for a Mid-Ocean Telegraph Station.

Fired by the encouragement Mr. W. C. Anderson's plan for founding "deep-sea lighthouses" received from scientific men, Francis Sheppard has evolved a scheme of the same kind so much more audacious that it challenges attention from its mere immensity. This scheme he calls a "proposed international mid-ocean life-saving signal and telegraph station," the plans of which have been engrossing him body and spirit for some time. He has confided his idea to the *Tribune* of this city. As it now exists in his brain, the mid-ocean station consists of a globular vessel made of iron and steel, to be provided with air-shafts, air-tight compartments, an engine, electrical apparatus for lighting, storage rooms, a cable connection, a watch tower, a life-boat, a rope bridge for boarding ships, a warning belt, etc. The electric lamps are planned so as to be converted at will into flash-lights, by which messages can be telegraphed in a manner similar to that now used by cable companies. This strange ship, which is to have room in its capacious belly for a ship's crew and passengers, besides the eight men who will be needed to care for it, and the provisions which such a community might need during an enforced sojourn in the station, Mr. Sheppard wishes to see built by the combined efforts of the nations of the earth (the estimated cost is a trifling $25,000,000) towed to a site in mid-ocean in the track of transatlantic steamships, and there anchored. He is at no loss for a plan by which to do this. There

should be four cables, "made of iron and wound with wire so as to give them great strength," and these should be "anchored to a huge anchorage composed of iron and stones fastened together and sunk to the bottom of the ocean." Each one of the four cables should be able to hold the station to its anchorage, and the weight of the cables should be overcome by air-tight compartments "at the top of the globe inside, so that it will not sink the station over two-thirds under water at any time." He likewise proposes to attach the cables to springs to overcome the floating partly. With this machine Mr. Sheppard thinks vast sums of money and many lives might be saved, vessels be supplied with provisions and water, lines be fired to disabled vessels if they came within signaling distance, and great good be done generally.

Practical mariners generally have great contempt for the untenable theories of scientifically inclined romancers, and Mr. Sheppard is by no means an exception. His plan being submitted to Captain Brenmer, of the Guion steamship Nevada, that gentleman relieved himself of the following opinions: "It's a mad scheme. If it were a possible thing, it would not be worth the money it would cost. It would seldom do any good, and it would be a singular coincidence indeed if wrecks were to occur near the station. I cannot remember a time in my experience when such a station would have helped me, though I have frequently been in need of assistance alongside. What would prevent it from being run down? All the electric lights and foghorns in the world would not, so long as there are fools in command who will run their ships aground on a lighthouse. Besides, he could not anchor it. What, four cables each big enough to hold in from 1,000 to 3,000 fathoms! I'd like to see the station that would remain above water with them attached. It's all folly. Why, fifteen or twenty years ago the English government abandoned as impracticable a plan to anchor a lightship between the mouths of the English Channel, where the water is comparatively shallow. The game wouldn't be worth the candle."

Captain Hains, of the Cunard steamship Aurania, also laughed it to scorn. "How are you to prevent the station from being run down?" was his first observation. "It would add to the dangers of navigation instead of lessening them. The lightship in the English Channel was abandoned after a year's trial, because it did no practical good and was only one more danger to be feared. I have crossed the Atlantic hundreds of times and never wanted a mid-ocean station yet. Some such thing might occasionally be of service as a signal station off the banks of Newfoundland if connected with the cable."

### Magnetizing the Meter.

He was rich, he was respected, and he lived in Philadelphia; but life held one great drawback which made him unhappy. His gas bill was too large. This fact embittered his existence.

One evening as he sat brooding over this sorrow a visitor was ushered into his presence—a dapper little man with a shrewd eye, a blonde moustache and but one ear, who boldly announced that he had a plan by which gas could be economized without robbing the city of a cent, said plan being both efficacious and honest. The rich, respected, but gas-ridden citizen listened, promised to subscribe, and asked for a bill of particulars.

"This idea is mine," explained the visitor. "I was a a 'meter taker' for the old Board of Gas Trustees. I know all the tricks of the trade, from 'leakage' to 'incidentals.' I can tell to a hundred feet how much gas you ought to burn in a quarter, and," here he lowered his voice, "I can make your meter register the correct amount of gas consumed!"

The host looked incredulous, and intimated he was too honest to pry off the dial, put the indices back where he wanted them to go, and get caught at it. To which the stranger replied:

"Sir, I will set your meter right—not wrong, remember—without touching the indices or displacing the dials. Why, sir, this is practical reform. As proof, my dear sir, of what this thing is, I may tell you that I have nearly 1,000 subscribers on my books, obtained since the first of the year. Their meters have all been operated upon and not one has been found out."

Thus assured of plenty of company in outwitting the gas people, the noble old man told the ingenious stranger that he might come the following Saturday and doctor his meter. But how was it to be done? Wouldn't he be found out? And wouldn't it be cheating, after all? These thoughts so burdened the Philadelphian's mind that he concluded to secretly watch the "meter-fixer' when he came, and report him to the authorities. With that generous intention he hid in his wine-cellar and watched him through a crack in the door.

The meter doctor was admitted to the cellar immediately. He carried a box about the size of a portable writing desk, with a crank on one side of it. He produced an implement of iron shaped like a horseshoe. He then turned the protruding crank vigorously and a buzzing sound was emitted from the box. Continuing this movement with his left hand, the magician raised the horseshoe and applied the two ends to the face of one of the dials, moving it slowly to the right before the glass. He next did the same with the second dial, turning it slightly to the left. Then the manipulator made an entry in his note-book, took up his box and departed. The good citizen emerged from his hiding place, and, sure enough, the dials registered 6,000 cubic feet less than they had an hour before. It represented $11.40 net profit. This surprised and frightened the householder. He knew that detection was certain. Therefore he determined to communicate with the gas trustees and warn the public.

The first person to whom he told the tale rushed off to a gentleman who is authority on magnets and asked:

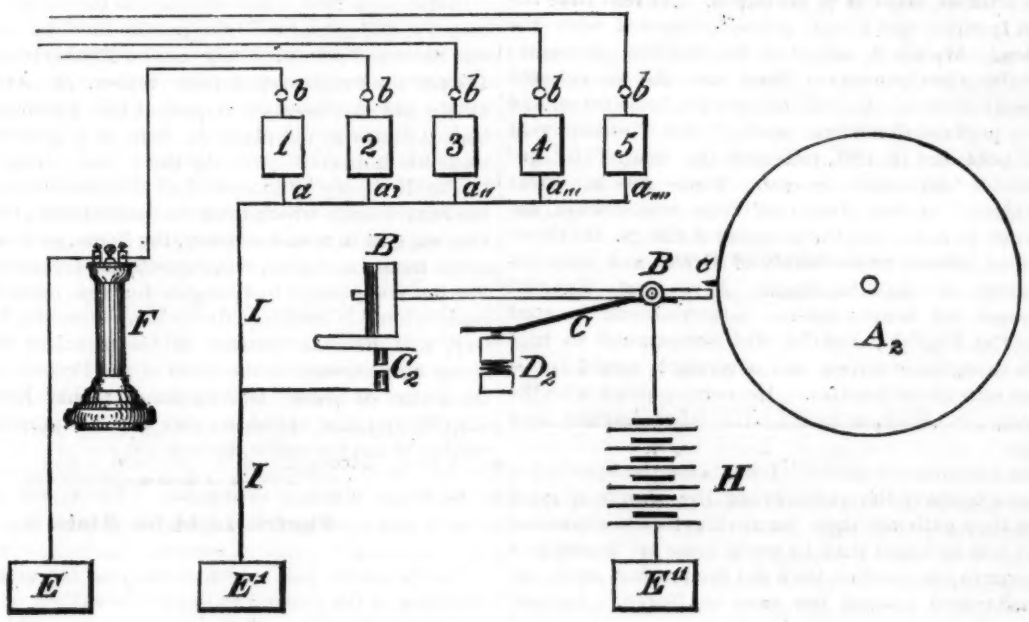
"Will a large magnet attract metals through a glass plate?"

"Certainly," said the authority, producing a small magnet and demonstrating the truth of his assertion with a pen on the top of a glass show-case.

"Could a magnet be made powerful enough to turn back the dial hand of a gas meter?"

"A simple magnet would hardly accomplish that," he replied, "but a soft iron electro-magnet, around which a strong current of electricity is sent, might be made powerful enough to achieve the desired end; though I know very little about the internal mechanism of a gas meter."

The honest old gentleman who was the hero of the tale was again hunted up. The establishment he had indicated as his home was a fashionable boarding-house, and the landlady explained that the "poor, dear old man" had been so much worse lately that he had been taken to the State's hospital for the insane.




### Oram's Telephone Time Service.

To the many conveniences which make the telephone a luxury a new one is just about being added—the transmission of time from a central station or from a standard clock. The accompanying diagram illustrates the system of Mr. J. M. Oram, of Dallas, Texas, which possesses merits of its own.

This invention enables the standard time to be furnished from a single clock, conveniently situated, by means of continuous signals repeated at all the minutes throughout the day. This standard time clock strikes for every hour and minute in the day; these strokes are made to transmit signals over all the telephone lines to their receivers, and the signals are significant to the subscribers of that particular hour, minute and second of time by the sound produced on their receivers or call bells.

The diagram shows the arrangement of the circuits and the devices for repeating the time in the receivers. The vertical ground line *I I*, and all that portion above and to the left of it represent the appliances and apparatus of a telephone exchange system *a a' a'' a'''* etc., being branch lines to subscribers of which there may be any number; 1, 2, 3, 4, 5, being annunciators, and *b b b b* the switch-board connections. *E'* is the office ground, *F* is the telephone, and *E* the ground at a subscriber's station. The subscriber's apparatus on the other lines is not shown. The repeater is composed of a cylinder $A_2$, having its surface covered with teeth, of which only one *c* is shown in the diagram; a lever swinging on a pivot *B* carries at its remote end a hammer $B_2$ which is furnished with a contact point $C_2$ that is normally prevented from closing a circuit to the lines by a supporting spring *C*. *H* is a battery, having one pole connected to the lever at *B*, and the other grounded at *E''*.

The cylinder of the repeating clock is started once per minute by the time mechanism of the clock. It makes one revolution, and by the engagement of its teeth (of which only one is here shown) with the short arm of the lever *B*, lifts the hammer *B*, which, when released, falls with sufficient force to overcome the resistance of its supporting spring *C*, closing momentarily the battery circuit *H* through $C_2$, lever *B*, circuit *I*, branches *a a' a''*, annunciators 1 2 3 4 5, connecting devices *b b b b* and subscribers' telephones *F* to earth *E*, thus changing the electrical state of the whole system of telephone circuit and producing a sound in all the telephones connected therewith. The omission of the earth connection at *E'* will slightly intensify the signals, but the resistance of the earth between *E* and *E'* is quite sufficient to cause a diversion of a very slight battery current through thousands of telephones. Let us consider, as an example of the operation of this system, the transmission of the time at three o'clock and fifty nine minutes (3.59). The clock causes this circuit closer to strike three times in the manner described with intervals of one second between each stroke, denoting the hour of three o'clock. Then, after an interval of four seconds, when it strikes five strokes with intervals of half a second, representing the ten-minute divisions of the hour, or fifty minutes past three; then after another interval of four seconds, it strikes nine times, with half-second intervals, signaling the minutes after fifty. These strokes written as heard, would appear thus:

3 5 9
--- ----- --------- 3.59

And the subscriber would know that it was three o'clock and fifty-nine minutes. This time service has been tested in every way in actual telephone service for over three months, and it is found to give the time every minute to an accuracy of a second to every telephone connected with the exchange, including territorial lines ninety miles in length, ten-cells Leclanché battery being sufficient for 1,000 telephones.

Mr. Oram deserves much credit for having produced a method of transmitting time which is so simple while yet so ingenious and well adapted to the purpose it strives to answer. Bearing in mind how slight—infinitely almost—an impulse of current will cause a sound in a telephone receiver, we will understand readily how unlimited practically is the number of stations which may thus be supplied with standard time from one standard chronometer, which could be made with such skill and precision as to be thoroughly reliable. We might even go further and state that by means of this simple system any observatory could furnish the time to the inhabitants of all cities within a radius of one hundred miles, by direct transmission to the telephone exchange of each place, whence it could be distributed to all the subscribers. The ticks produced in the telephone are infallible as well as instantaneous.

The system is in operation with the best of success in the Dallas telephone exchange, where now every telephone is literally converted into a "time-piece," and we are informed that many subscribers depend on this new kind of tick entirely for the time of day.

### The Sun's Heat the Same as that of Powerful Electric Arcs.

In a recent lecture on Solar Physics, at the Royal Institution, Sir William Siemens gives his reasons for setting the temperature of the photosphere of the sun at about 2,800 degrees C., instead of about 10,000 degrees, where Rosetti and other late investigators put it. He agrees in this lower estimate, with Violle, St. Clair, Deville and Sir William Thomson, and thinks that the solar temperature cannot much, if at all, exceed that of the most powerful electric arcs. He recognizes fully the fact that a temperature higher than 3,000 degrees C. would be absolutely conclusive against his theory that the solar heat is due to the recombination or burning of compound gases at the surface of the sun. He bases his estimate of the solar temperature upon three foundations: First, the behavior of a carbon rod and a small gas flame in the focus of a reflector exposed to the sun; second, on a comparison between the spectra of various lights, for instance, the Argand burner, an incandescent lamp, the electric arc, and the sun itself, as observed by Langley on Mt. Whitney; third, upon experiments on the relation between temperature and radiating power, made by means of a long platinum wire heated by an electric current.

### The Originator of the Signal Service.

Nothing in the field of romance is more interesting and eventful than the career of the late Prof. James P. Espy, the originator of our present Signal Service. As related in the *Philadelphia Press* it is a biographical sketch of special value:

When Espy was about ten years old his father died, and mother and son tramped from their home near Harrisburg, Pa., out to Ohio. The boy was put at farm labor, at which he served until 17 years old, for the meagre pay of fifty bushels of corn a year. A signal incident marks the commencement of his career. Henry Clay was then just rising to fame, and young Espy found himself one afternoon within sound of the silvery voice which was yet to captivate its tens of thousands.

Espy was entranced by its witchery and followed the American Cicero as a needle does the lodestone. He got near enough to Mr. Clay to have some one mortify him by pointing him out with, "Here, Mr. Clay, here's one of your admirers! He's 17 years of age, and can't read." Mr. Clay laid his hand affectionately upon the lad's head and said, "Come, my lad; let us see if we can find a book store hereabouts." A book store was found. Mr. Clay purchased a copy of Noah Webster's spelling-book; and, pointing to the first letter with a long index finger, said: "This is the letter 'A.' Do you understand? Yes! Well, there are twenty-five more of them. You must learn the rest, and when you have learned them it will not take you long to learn to read."

Ten years after this time Espy was here in Philadelphia engaged in teaching school. John Troutwine, well known to many citizens, was one of his pupils. At that time the Franklin Institute had a high school connected with the institution. Walter R. Johnston was the first professor; his specialty was chemistry. Espy was the second, and taught mathematics. He was hungry for knowledge, and the motto prefixed to his first work, "The Philosophy of Storms," published in 1841, indicates the man: *Felix qui potuit rerum cognoscere causas.* There was no great "Unabridged" at that time, and Espy was always unhappy until he found out the meaning of things. He therefore applied himself to the study of Greek, and soon became master of that language. Says Capt. Erseyis: "Espy could not write a ten-line advertisement in good and graceful English; but he was accustomed to note down his thoughts in Greek, and afterward would translate them into his vernacular. He corresponded with the great Arago, in Greek, as he did with other learned men in Europe."

He was a student of nature. Long before he knew why, Espy began to study the mystery of the slowly moving clouds as they gathered their forces together in elemental warfare; but he found that he could come no nearer to a true answer to his question than did the prophet from his storm that roared around the cave in Horeb. Failure, however, did not deter him. If the storm would not call back in answer to him from the clouds he could reach up to them by means of Franklin's messenger, the kite; and, when the strongest cords were broken in his adventurous attempts, leaving only blistered and lacerated hands, he bound his emissary by means of strong wire reeled on a windlass.

Espy was a most patient collector of data, and facts were the basis and support of all his theories. He was patiently industrious in acquiring facts by observation and comparative experiment. In hundreds of fields, then vacant, now covered with houses, in and around Philadelphia, he studied the laws which govern the winds, the causes of the storms, and determined upon those artificial means by which rains may be produced. But the time was not yet ready for him. When he went to Washington, asking of Congress a paltry $5,000 a year for five years, that he might be enabled to extend his experiments and enlist the aid of others over a larger area than Philadelphia's back lots, he was met with gibes and ridicule. Senator Preston, of South Carolina, said Espy was a madman, too dangerous to be at large, and the Senator would vote a special appropriation for a prison in which to confine him. Espy was in the Senate gallery at the time. Wounded to the quick, he came down and found his way back to Philadelphia.

Gathering heart once more, he went to New York and put a small advertisement in the *Evening Post* announcing a lecture at Clinton Hall, in which he would show how rain could be produced. Espy expected to meet a crowd of a thousand people. The audience was a Miltonic one, "fit though few," for hardly a score of persons were present. Among them were William Cullen Bryant and, as Espy afterward found, his life-long friend, adviser, pupil and lover, Captain Samuel Erseyis. Espy went through his lecture; then submitted to a running fire of questions, and, these answered, frankly confessed his disappointment. Clinton Hall had cost him $18. There was a hotel bill to be paid, and he had but $5 in the world with which to pay this vast and impossible sum. He had in stock five sets of lectures, price $5 a set. That was all.

There was a pause of a moment or two, after which Capt. Erseyis promptly subscribed $25 for the course, put the money into Espy's hands and was immediately followed by Bryant and nearly all those present, until his pockets were filled, and Espy himself was as overcome as a child. Before New York would let him go, he delivered nine courses of lectures; went thence to Boston, where he gave six, and then made a tour of the country and $25,000 besides.

Soon afterward he sailed for Europe. Not long after reaching Liverpool, January 6, 1839, a great storm occurred. He went to Lloyds, consulted the newspapers as they arrived, noted the direction of the wind as given at the different places, and from these data constructed the first great storm map ever prepared, with the hour-points marked. Every line and curve and point exemplified his theory. He was at no loss now for audiences. He appeared before the British Association of Scientists at London, at which Sir John Herschel was present, an interested auditor. He crossed the channel to Paris, and the Academy of Sciences appointed a committee, composed of the illustrious Arago, with whom were joined Messrs. Pouillet and Babinet, "to report upon the observations and theory of Mr. Espy, which have for their object the aerial meteors, known by the names of storms, waterspouts and tornadoes, which occur in the vicinity of the Gulf of Mexico; storms, however, which are produced in every part of the globe when a few given conditions concur in one place."

The length of the Arago report indicates the strong hold which Espy's startling and conclusive array of facts had made upon the minds of the members of the Academy, and also evinces the care with which the committee studied the subject from its scientific standpoint. The effect of the report when it reached Washington was not much different from that which followed afterward, the announcement of Morse's first transmitted message over the wire from Washington to Baltimore.

In due time Prof. Espy returned to the capital of his own country, and one of the first public men he encountered was Senator Preston. They met on Pennsylvania avenue. Toward the conclusion of their report, M. Arago's committee had expressed the hope that the government of the United States would place Mr. Espy in a position to continue his important investigations and complete his remarkable theory by means of all the observations and all the experiments which even the deductions of his theory may suggest in a vast country, the home, as it were, of the aerial meteors, storms, waterspouts and tornadoes. Senator Preston was prompt to apologize for the mistake he had made when his language drove Espy from the Senate gallery, and he was profuse in his promises to help the storm king onward in the spirit of the French report. It is a matter of history that he did so; that Espy got his $25,000, and that to him we owe the first step in the formation of the present signal service.

### Electric Light for Mines.

This is not the best season of the year for attracting the attention of the general public to the subject of explosions in mines. The atmospheric condition is equable and comparatively safe; there are no startling announcements of colliery explosions, with their ghastly tale of figures, which at another time of the year become almost monotonous with daily repetition. But, for that very reason, this is the time for making an effort to prevent their recurrence, to try experiments which may now be conducted with safety, but which, later on, it would be impossible, or at all events dangerous, to attempt. On these grounds, therefore, we would earnestly reinvite the attention, not of the public so much as of electricians, to this most important subject—a subject which will assuredly bring both fame and profit to him who may be fortunate enough to dispose of it satisfactorily.

We say reinvite their attention, for there was no lack of it when popular favor first warmly espoused the electric light. Its applicability to the lighting of coal mines was at once fully appreciated by those who were scientifically engaged in the work, and we heard of several isolated attempts to establish its practicability. From time to time we have noticed the introduction of the light into a mine here and there, but, for some cause yet to be explained, the experiments have not been so numerous as we had hoped and expected. Some discouragement probably arose from the supposed necessity for using currents of such a strength and character as to be of themselves dangerous. The successful application of perfectly safe currents above ground for lighting purposes has removed this hindrance to the lighting of underground spaces, and we see no present reason why a fresh effort should not now be made on the part of electric light promoters to include the proprietors of mines among their best customers.

The immediate cause of the terrible catastrophes to which all toilers in mines—especially, of course, in coal mines—are periodically exposed is usually a subject of conjecture, the only witnesses who could afford positive testimony having been launched beyond the reach of all questioning. But there is little doubt that failure of the safety lamp, or negligence in its use, is at the bottom of most of the accidents traceable to the explosion of fire damp. Davy's invention was, undoubtedly, one of the most beneficent contributions to the welfare of mankind that science has ever conferred, but in an indirect way it has not improbably led to greater carelessness in the matter of ventilation, and therefore to greater risks in the employment of any sort of light where carburetted hydrogen is apt to collect. It would, we suppose, be almost treason to hint at the possibility of the lamp itself, under certain conditions, being capable of igniting an explosive gas, but so many accidents do occur, notwithstanding the obligatory use of the safety lamp, that we are unable always to attribute them to the culpable negligence of the men most profoundly interested in using it with care. The lamp is not considered quite safe, we believe, when an explosive mixture passes through it with great rapidity—a condition of things that may be brought about at any moment, for example, by the accidental rupture of a partition dividing two adjoining galleries, the atmospheres of which are of different temperatures. One of its merits is that it is extinguished when an atmosphere is entered which would be fatal to the bearer, thus giving him timely warning of his danger. But here the temptation arises to obtain a light, even at the risk of an explosion, for though the platinum wire which encoils the flame continues to give off a faint glow after the lamp itself is put out, the man is soon left in darkness. He wants to resume work with natural, and sometimes with incautious haste, the consequences of which are only too often disastrous.

Now, what is wanted under these circumstances is an adequate illumination of the mine in a manner that the carrying of lamps would be rendered superfluous, and explosions from causes directly or indirectly attributable to their use impossible. The electric light, it seems to us, is just the thing to supply this very grave defect. Its fitness is indeed so obvious that we need not enlarge upon it here. With incandescent lamps, duly protected, wires properly encased and currents powerless to do mischief, there is no reason why the shafts and galleries of every mine should not be as well lighted as any factory or workshop after dark. Some experiments would, of course, have to be made, owing to the novel conditions under which installations of this kind must be carried out; but the nature of the difficulties to be overcome is pretty well understood, and this, we say, is the time of the year when the attempt to overcome them can best be made.

The question of expense ought not, in a case of this sort, to stand in the way of so great an improvement. There is here no competition with gas to be considered; the electric light would present itself on its own merits without a rival, and those merits are of the highest possible kind where the hardships of human labor and the danger to human life can be so greatly mitigated by its means. And this observation applies to all classes of mines, whether collieries or not, for undoubtedly miners in general would pursue their callings under greatly improved conditions, and their output would consequently be proportionally augmented if they were allowed the inestimable privilege of working in an atmosphere thoroughly well lighted and at the same time thoroughly safe.—*London Electrician.*

### Lighting the Elgin Towers at Evansville, Indiana.

*To the Editor of The Electrical World:*

SIR: The long-delayed tests of electric street illumination was made at half-past twelve last night, and continued until the electric rays were neutralized by daylight. A more delightful improvement has never been inaugurated in this city.

The mayor, several members of the city council and other prominent personages were informed early in the evening that the lights were ready to blaze as soon as the moon left the field. They were driven over the city, and when brought into the lighting station at three o'clock A. M., were infatuated with the city's *robe de nuit.* Every one who has been instrumental in procuring the new light is quite proud of their connection with it. Mr. Shanklin, of the *Courier*, asserts that the credit must be shared with him, as his suggestion to the city council caused a provision to be made in the last contract with the gas company, which left the city free to contract for a cheaper and better light at any time.

The effects produced by the lights are extremely beautiful. The lights are generated by five Brush dynamos, with a combined capacity of 232,000-candle power. The two Cummer engines are 14 by 30, with clutch devices so arranged that they can be connected or worked singly without altering the speed of the line shaft which furnishes mechanical energy for transformation. This light is distributed from ten Elgin towers, 150 feet high, with four lamps of 4,000-candle power, suspended on cross-arms from the top of each tower. The towers are admirably located, quite ornamental, guyed by wire rope, triangular in shape, and supplied with basket and endless rope with weight so arranged that a man can easily pull himself up. They are supplied with steps also.

There are two wooden masts, fifty feet high, with one 4,000-candle power lamp on each. Fourteen arches have been built in the business portion of the city. They are fifty feet high, and each in its centre holds a lamp of 2,000-candle power. These arches are on alternate crossings. The posts supporting them are ordinary telegraph poles, shaved and painted, and are planted on diagonal corners of the street. The arch is composed of bars of flat iron, so constructed that a man can climb out to the centre to look after the lamp. This 196,000-candle power of light is intended to light an area of four square miles, but it really lights a great deal more. The light was tested one mile from the nearest town in the country, and the time of night could be plainly read on a watch. C. J. M.

EVANSVILLE, Ind., July 14, 1883.

### Consolidating all the Telephone Companies in New England.

A telegram from Boston says that the consolidation of the New England telephone companies would probably be effected in that city on Thursday, July 19, when the directors of the American Bell, the Lowell syndicate, and the several sub-companies were to meet and consider a plan of union. The plan involved a considerable increase in the present capital stock of the companies to bring them upon a common 6 per cent. dividend-paying basis, as several of them have been paying dividends considerably in excess of that figure. The following, it is understood, embraces the principal features of the basis of the union: The Boston and Northern Telephone Company, which comprises Essex County, Mass., and nearly the whole of New Hampshire and Vermont, now has a capital of $1,000,000, of which the American Bell Company owns $300,000. This will probably be put in at 20,000 shares, or $2,000,000. It has been paying 12 per cent. dividend. The Bay State Company, which embraces the State of Massachusetts, with the exception of the cities of Boston, Lowell, Fitchburg, Worcester, Brockton, New Bedford, Fall River, and Taunton, Essex County and Cape Cod, with $800,000 capital, of which the American Bell owns $240,000. This capital will doubtless be increased 50 per cent., to $1,200,000, as it now pays 9 per cent. dividends. The National Bell Telephone Company of Maine now has a capital of $1,500,000, it having been recently increased by a 200 per cent. stock dividend from its original capital of $50,000, and now pays 5 per cent. The Granite State Company, of Manchester, N. H., with a capital of $130,000, will doubtless remain the same under the new arrangement. Its dividends heretofore have been 5 per cent. The Suburban Telephone Company, embracing the cities and towns within a radius of 15 miles of Boston, now has $350,000 capital. This will probably be increased to $500,000, as it is now paying dividends at the rate of 9 per cent., and has paid 10. The Southern Massachusetts, with a capital of $500,000, embraces the cities of New Bedford, Fall River, Brockton and Taunton, and the southeastern portion of the State. Its capital will probably be doubled and made $1,000,000. The Telephone Dispatch Company, which covers the city of Boston, is owned entirely by the American Bell Company. It will probably be put at $2,000,000. The Connecticut Telephone Company, which embraces, also, several towns outside of Providence, will probably go in at $500,000. In addition to the companies mentioned, there are several small companies and exchanges which will be put in at less amounts, making the aggregate capital of the consolidated company somewhere between $12,000,000 and $15,000,000.

### The Manufacture of Insulated Wire.

Mr. Alfred F. Moore, the well-known manufacturer of insulated wire, has published a handy price-list of his various covered wires for telephone, telegraph and electric light purposes. It includes magnet wire, bare pure copper wire, bare and insulated German-silver resistance wire, office wire, resistance wire, annunciator wire, fireproof electric light wire, armature wire, flexible copper wire rope, office and tower cable, gutta percha insulated wire, Kerite covered wire, phosphor-bronze wire, telephone and switch cords, flexible cordage, phosphor-bronze, hard copper and steel wire, bare and insulated, for acoustic telephones, and galvanized iron telephone and telegraph line wire. Electricians will find the pamphlet exceedingly valuable. The appendix gives a table showing the difference between the London, Stubs and Brown and Sharp gauges, and another giving the number, diameter, weight, length and resistance of pure copper wire. Mr. Moore's insulated wire manufactory was established sixty-three years ago—in 1820—by Mr. Joseph Moore, father of Mr. Alfred Moore, who has spent his entire life in the business. The elder Mr. Moore is said to have made the first electric wire manufactured in the United States, also the insulated wire which Professor Morse used in his experimental telegraph line between Washington and Baltimore. Mr. Alfred Moore manufactured the thirty-three wires for the cable now being laid in Philadelphia by the Brooks Underground Conduit Company. He manufactures wire to supply every demand in electrical commerce. The advent and growth of telephone interests, the increasing activity in electric lighting and all other electrical business, have given the manufacture of insulated wires a great impetus.

### Why the Lights Go Out.

Electric lights, like all other terrestrial things, are not infallible, and sometimes astonish even their originators by becoming suddenly extinguished from unexpected causes. President Lynch, of the United States Electric Lighting Company, when questioned in regard to this peculiarity made the following explanation for the benefit of the general public:

"The fact is the electric lights are going out all the time, like everything else that shines. But they are going out one by one, and we employ a large corps of inspectors who are always going round renewing the lights that are getting ow. The life of an electric lamp is long, but it varies. One of our lamps in the post office burned for 3,500 hours. Other kinds of electric lights have to be repaired or renewed every night, but the inspectors are always on hand where such lights are in use."

In regard to the lights on the Brooklyn Bridge, which sometimes burn very low and sometimes go out entirely here and there, he said:

"It was some time before we were able to illuminate the bridge perfectly. At first the oscillations of the structure interfered very seriously with the lights. You know how those lamps are constructed. The carbon points—one from above and one from below—must be exactly opposite for the lamps to burn steadily. But the vibrations caused by a single vehicle passing over were sufficient to compel the carbon points to work out of apposition, and of course you couldn't get a steady light. Now, however, we have arranged the lamps so that they stand perfectly straight, independently of the vibrations of the bridge, and they are working almost as perfectly as if they stood on terra firma."

When asked why lamps that stand on solid ground sometimes all go out at once for a whole district, he replied that that used to happen now and then during a great storm, but is very rare now. Such accidents were caused by the wires grounding.

### An Explanation of the Term Meter.

In a paper on "Meters for Power and Electricity" in the popular Science monthly for July, Mr. C. Vernon Boys says: I shall at once explain what I mean by the term "meter," and I shall take the flow of water in a trough as an illustration of my meaning. If we hang in a trough a weighted board, then when the water flows past it, the board will be pushed back; when the current of water is strong, the board will be pushed back a long way; when the current is less, it will be pushed so far; when the water runs the other way, the board will be pushed the other way. So, by observing the position of the board, we can tell how strong the current of water is at any time. Now, suppose we wish to know, not how strong the current of water is at this time or that, but how much water altogether has passed through the trough *during* any time, as, for instance, one hour. Then, if we have no better instrument than the weighted board, it will be necessary to observe its position continuously, to keep an exact record of the corresponding rates at which the water is passing, every minute, or better every second, and to add up all the values obtained. This would, of course, be a very troublesome process. There is another kind of instrument which may be used to measure the flow of water: a paddle-wheel or screw. When the water is flowing rapidly, the wheel will turn rapidly; when slowly, the wheel will turn slowly, and when the water flows the other way, the wheel will turn the other way, so that, if we observe how fast the wheel is turning, we can tell how fast the water is flowing. If now, we wish to know how much water altogether has passed through the trough, the number of turns of the wheel, which may be shown by a counter, will at once tell us. There are, therefore, in the case of water, two kinds of instruments, one which measures *at* a time, and the other *during* a time. The term meter should be confined to instruments of the second class only.

### An Electric Sun Under the Sea.

According to the London *News*, the International Exhibition at Nice is reserving some wonders for the foreigners who may pass a portion of the coming winter on the borders of the Mediterranean. One of these is a balloon which its inventor, M. Tosselli, calls "the observatory under the sea." It is made of steel and bronze, to enable it to resist the pressure which the water produces at the depth of 120 metres. This "observatory under the sea" has a height of eight metres and is divided into three compartments. The upper apartment is reserved for the commander, to enable him to direct and to watch the working of the observatory, and to give to the passengers the explanations necessary as to the depth of the descent and what they will see in the depths of the sea. The second apartment, in the centre of the machine, is comfortably furnished for passengers to the number of eight, who are placed so that they can see a long distance from the machine.

They have under their feet a glass which enables them to examine at their ease the bottom of the sea, with its fishes, its plants and its rocks. The obscurity being almost complete at 70 metres of depth, the observatory will be provided with a powerful electric sun, which sheds light to a great distance in lighting these depths. The passengers have at their disposal a telephone, which allows them to converse with their friends who have stopped on the steamboat which transports the voyagers to such places as are known as the most curious in the neighborhood. They have also handy a telegraph machine. Beneath the passengers an apartment is reserved for the machine, which is constructed on natural principles—that is to say, as the vesicle of a fish, becoming heavier or lighter at command, so as to enable the machine to sink or rise at the wish of the operator.

### Telephonic Experiments of a Russian Government Electrician.

Russia is advancing rapidly in electrical knowledge, the telephone and the electric light receiving particular attention. Peter Shoulatchenko, the eminent Russian electrician, was sent to Kouldji by the government to conduct experiments with the telephone for military purposes. He was directed to especially examine the different instruments, their power of transmission, the distances at which sounds may be easily heard, slightly distinguished, and the exact distance when they become confused and indistinguishable. He was also to examine into the best methods for capturing dispatches of enemies. His experiments upon distances produced the following results: At a distance of from 50 to 70 versts, sound could be heard exceedingly well, the detonations of the voice being distinctly audible; from 70 to 100 and 150 versts, easily and clearly; from 150 to 210 versts, sensibly; from 210 to 310 versts, lightly as a whisper, although perfectly clear; while from 310 to 450 versts, a whistling sound interfered, and expressions could be understood only by raising the voice almost to a shout. In experimenting upon the best way of capturing telegraphic or telephonic dispatches, Mr. Shoulatchenko decided that simply tapping the wire, without parting it, by winding a copper wire around it for a short space, would give the whole business that was being done over the trunk wire, without in any way interrupting the passage of the message. He captured in this manner dispatches sent from the principal cities of Russia to and from St. Petersburg, and upon comparison they were found in every case to be correct.

### Electric Light in Mines.

Not long since Mr. J. C. Flood stated that he was considering the advisability of putting electric lights into the Comstock mines at Tucson, Arizona. This question has been favorably decided upon, according to the *Tucson Citizen*, which says: A number of mining companies in this territory are about to adopt the electric light to facilitate operations underground as well as on the surface, notably the Silver King Mining Company, the Howell Smelting and Mining Company, and the Conger Mill and Mining Company. At the Silver King mine it is proposed to use four 3,000-candle power Brush arc lights above ground and two below, together with 25 small incandescent lamps. The dynamo, located near the main shaft, will supply the current (descending 800 feet to the lower levels of the mine) to the arc lights and storage boxes, from which latter Swan lamps are to be connected by small copper wires. Fixed lamps are to be suspended from the roofs of galleries, and the portable lights are to be attached to flexible conductors for the convenience of shifting. These lights are to burn continuously, night and day. In the reduction works of this company both large and small lights are also to be used, a separate dynamo and two storage batteries supplying the current. The arc light circuit in the Silver King mine will be about half a mile in length.

### The District Telegraph Boy.

What is that?
This is a District Telegraph boy.
But what is a District Telegraph boy?
He is a boy who appears at your door twenty minutes after you fool with a little box which says "b-r-r-r-r-r."
Oh! he is the boy who takes messages?
Yes, darling, he takes messages.
But this boy has no message?
Yes, he has, dear.
What is it?
It is an urgent appeal for the doctor to come right away to a man who is dying.
My! but why doesn't the boy hurry?
He is hurrying.
To do what?
To count the marbles exhibited in the window.
And when he has counted the marbles will he go?
Certainly, dear.
Where?
To the next window.
And then?
To the next.
Gracious! how far is it to the doctor's?
Seven blocks.
How long will it take the boy to get there?
About three hours.
Goodness! the poor, sick man may die before the doctor comes.
He probably will, sweet.
Well, is not the poor District Messenger boy to blame?
No, precious.
Who are to blame, then?
The sick man's friends.
How?
They should have gone for the doctor themselves.
And what will they do now?
They will go for the boy.
And what will he do?
He will say he was "detained."
And what is that?
A lie. —*Life.*

AN ARTIFICIAL MOON.—A brilliant swindler who believed in the old mercantile saw, "Quick sales and small profits," reaped a rich harvest from the madding crowd at Coney Island recently. The implement with which he fleeced the gullible was a telescope, ten cents being the charge for a look at the new moon, when there wasn't any moon. At last somebody discovered that there was no glass in the machine, and that it was pointed dead at the electric light on top of the observatory.

### Electric Light Speculation at London.

The *Pall Mall Gazette* says: "Electric light shares, which last year rose to fabulous prices, are well known to have fallen again to a ruinous extent for those who bought during the mania. So long as the public were inclined to buy, the contest between those in the market who had money and those who had stock was a very unequal one. The command of money was limitless, and prices rose. After a time the rise ceased, and then came a collapse. Every now and then since the collapse there have been passing signs of another 'rig,' although nobody can expect to see such a rise as took place when the whole thing was new and nothing about the electric light was calculable in advance. Hammond shares, for instance, which rose to 20 or thereabout, when the mania was in action, had lately dropped to par, which is 2½ per share; but dealers and outside operators who had been successful in selling the shares continually all the way down, to use their own expression, have not known when to stop, and are now caught by a rise, and are without the shares they had contracted to deliver. The price has advanced to 4, mainly or solely because the current settlement disclosed a scarcity of shares. In a word, the possessors of money have the non-possessors of shares again to some extent at their mercy. All electric companies expect to do better business when the autumn comes on and the pending provisional orders for local bodies are passed, but that is the immediate cause of the rise."

### The Metropolitan Press on the Strike.

[From the Sun, July 19.]

Like all important questions, the present one has two sides, on either of which many strong arguments may be used. The employés say, with truth and force, that the capital of the Western Union has been increased from a few hundred thousand dollars to $80,000,000, most of which is merely water. Upon this fictitious capital a handsome dividend is paid, and all the money which is earned by their hard labor goes into the pockets of capital, leaving the condition of labor unimproved. Thus the rich daily become richer and the poor poorer. The officials, on the other hand, say that the demands of the employes are excessive, and that the company is always ready to recognize merit by advancing wages. But they object to any indiscriminate advance. Merit, they think, should be the sole arbiter, and the employé, who by his ability and good conduct makes himself useful should be rewarded by an increase of pay, while the incompetent and lazy remain at the bottom of the ladder. It is said now by people connected with the Western Union Company that the present movement of the employés has been engineered by a wealthy man of socialistic proclivities, who has recently mortgaged all his property, sold Western Union short in the market and promised the Brotherhood his support if its members would strike, and by so doing depress the price of the stock. If this be so, a Prince Krapotkine has risen among us, and the fight may prove a long and bitter one.

[From the Times, July 19.]

The only new feature in the telegraph contest is presented in the action of the Western Union Company yesterday. Its Executive Committee made no reply to the demands of the Executive Committee of the Brotherhood of Telegraphers, but directed a sub-committee to inquire into the complaints of the employés of the company and report thereon. The Brotherhood committee appears to have been ignored as having no right to represent or to speak for the operators of the Western Union Telegraph Company, but there is little wisdom in ignoring the practical fact that it does represent such of them as are members of the Brotherhood, and is likely to be obeyed by them if a strike is ordered. The operators' side of the contest is absolutely in the hands of the Executive Committee of Seven, whose members refuse to divulge their purposes. In view of all the interest at stake, it is to be hoped that strenuous efforts will be made to settle that difficulty without resorting to that step, but it is doubtful if it can be done if the Western Union Company insists upon the position that its operators can hold no relations except with itself. Much might be said regarding the rights and wrongs on both sides, but the practical question just now is how to reach a fair adjustment of the relations of the operators with the companies without disturbing the business of the country. Both parties should work together for this end. They cannot attain it by working apart.

[From the Herald.]

A general strike of telegraph operators would be one of the few instances in which the losses suffered by the companies and employés would bear a very small proportion to those of the general public. Instruments of communication—the railroads, steamers and telegraphs—are become such an essential part of our commercial and industrial being that a stoppage or deprivation of one for a day even would be seriously felt, and enormous injury to trade would result. The responsibilities resting upon each party—responsibilities to themselves as well as the public—are too grave to justify either in standing out persistently and obstinately against the other. It is of the utmost importance to the strikers that their cause be sustained by public sentiment, and public sentiment seems to be that, while they may have ground for complaint, the demands which they have made are somewhat unreasonable. The company, on the other hand, will forfeit all claim to popular sympathy and approval if it turns a deaf ear to the complaints of its employés and treats their demands with haughty contempt. The wise course for each side to pursue is one of reason, conciliation, compromise and fair dealing. Let the two parties meet half way in a friendly spirit. Let them compromise. Let the strikers recede from their extreme demands and take half a loaf in lieu of a whole one. Let the company show a like conciliatory spirit, and make reasonable concessions. By this course neither side will gain a triumph over the other. It will be a victory for both, and a sensible settlement of the difficulty that ought to be just and satisfactory to each, and will win the approval of the public.

[From the Mail and Express.]

The Executive Committee of the Brotherhood must feel that they are in a position where they should be "as wise as serpents and as harmless as doves." If through their vanity, or mistakes, or undue exactions, or failure to feel for the possible troubles of thousands of followers, the nervous system of the country comes to a dead stop, and confusion and losses, disasters, deaths, and destruction follow, as they surely would, 15,000 people, at least, and those dependent on them, will begin to ask why the "Executive Committee" did this or that, or failed to do or say this or that, and did not, by the use of all honorable means, avert the calamities that were inseparable from a strike. It can hardly be expected that the great mass of the men and women whose good opinion is valuable and essential will understand why the business and journalism of the country should suddenly be taken up by the throat, pending a pressing demand, not only for a large advance of wages and a large decrease of service, but for driving women out of the telegraph service by the disingenuous and cowardly method of making their wages equal to those of men.

[From the World.]

There is just a live possibility that mankind will one day be startled by a new sensation in the shape of a news famine. Striking telegraph operators, who have a close organization and means of communicating secretly with each other all over the country, open up possibilities in that direction that cannot well be measured. It would be a curious situation indeed if one-half the world in the nineteenth century should suddenly be unable to tell how the other half lived. Fancy the consternation pictured on the faces of seven thousand night editors actually destitute of a scrap of news. And then go one step further and imagine the woe-begone aspect of fifty million wretches the next morning who were absolutely unable to tell who had been killed, or who had been nominated, or what the condition of the Count de Chambord's health was. But let us not attempt it. The thought is too dreadful.

[From the Commercial Advertiser.]

The trouble with the telegraphers is likely to put an entirely new phase on the labor question in this country. Heretofore the general public has not been especially concerned in the demonstrations that have been made. Even the railroad strikes did not come home to all. With telegraph communication interrupted even for a week, a condition of affairs would be brought about that it is not pleasant to contemplate. Business would be disorganized; great losses would be sustained; there would be many failures; perhaps a panic. The Telegraphers' Trade Union holds a veritable Pandora's box in its hands. It may be said to control the key of the situation. If the exactions of its committee are once complied with what is to prevent the union making others? If the company submits once, why should its members not threaten to strike again?

[From the Star.]

Operators of average competency are now much more plentiful than they were a dozen years ago, and there are probably two applicants in wait for every vacancy. On the other hand, the telegraphers appear to be now organized into a powerful Brotherhood for self-defense. Their union is far-reaching in its membership, and is fortified with the sympathy of the Knights of Labor. Under such circumstances a strike among the Western Union operatives would be an obviously serious and formidable movement. The demand seems fair and moderate enough, and the Western Union Company, with its enormous earnings on liberally watered stock, should lead the way in making equitable concessions to its employés.

[From the Tribune.]

It is not probable that an order to strike would be obeyed by more than a small part of the telegraphers. But that would greatly inconvenience the public, without benefiting the men. Strikes are a decidedly poor way to settle labor disputes, and are growing less in favor with the workmen, as the advantages of arbitration come to be better understood. It is a refreshing novelty, however, for any class of workmen to be threatening to strike in order to obtain for women employés the same pay as the men receive.

## THE TELEGRAPH.

EXTENSION.—The telegraph line over the Wichita road, in Kansas, was completed on July 7, and Fort Scott can now communicate with Wichita, directly.

VENEZUELA TELEGRAPH LINES.—Notice has been given that the government telegraph lines of Venezuela were opened July 17 to the frontier of Colombia, where they connect with the land lines of this government, which are in direct connection with the lines of the Central and South American Telegraph Company, via Galveston.

EFFECT OF THE STRIKE IN WALL STREET.—On Thursday forenoon speculators were watching the telegraphic situation with lynx eyes. On the probabilities of no compromise, the bears in telegraph stock, helped by a demoralized market, sold it down under profuse offerings from 79¾ to 77¾., a decline of two per cent. after which, it rallied to 78¼.

WESTERN UNION SUED FOR DELAY.—Mr. W. T. Provost, of Chicago, says that on April 9, last, while at New York city, he handed the Western Union Telegraph Company the following dispatch, addressed to E. G. Noble & Co., Open Board, Chicago: "Am sick of N; take the scalp." He had that day purchased through Noble & Co. 25,000 bushels of wheat, for May delivery, and the dispatch interpreted was an order to sell immediately at market rates. This dispatch, plaintiff claims, was delayed so in delivery that a loss of $500 was sustained on his deal, and for this sum he sues.

THE MICHIGAN POSTAL TELEGRAPH COMPANY.—Articles of association of the Michigan Postal Telegraph Company were filed with the County Clerk at Detroit on July 9. The association is organized for the purpose of co-operating with the American Postal Telegraph Company, the new line which has extended west from New York City as far as Cleveland. The Michigan company will extend lines to Toledo, Chicago, East Saginaw, Lansing, and other points in the State. The incorporators are Don M. Dickinson, George de Buleu, Albert Ives, Albert Ives, Jr., and George Farnsworth, well-known capitalists of Detroit. The capital stock is $50,000.

A PROSPEROUS DISTRICT COMPANY.—The Mutual District Messenger Company of Boston is meeting with a success which is quite gratifying to stockholders, considering the brief time the consolidated company has been in operation. The company is capitalized for $250,000, of which $50,000 in stock is in the treasury. One-half is owned by the Western Union Company and the balance by private capitalists, the latter representing the old Mutual Union Messenger Company, having control for the first year by virtue of the terms of consolidation with the old Western Union messenger company. The new company has a contract with the Western Union Telegraph Company to receive and deliver its messages for a series of years, and conducts a general messenger service in addition, the principal office being in the Old State House. The June report of General Manager Hern shows these interesting facts: Number of offices in Boston, 17; call boxes in circuit, 1,700; miles of line in operation in the city, 114; average messengers employed, 255; calls received, 21,560; telegrams delivered, 105,092; telegrams collected, 25,334; revenue from district service, $2,340.87; revenue from telegraphic service, $5,233.39; box rentals and burglar alarms, $255.66; total revenue, $7,829.92; total expenditures, $6,018.20; net revenue, $1,811.72; or more than 9 per cent. on the issued stock.

WOMEN IN THE TELEGRAPH SERVICE ABROAD.—Edith Snow writes: "The German women, I am sorry to say, are so trampled down by the militarism of the last decade that many things which previously showed a brighter aspect have become dark again. The few grants even formerly made by the government in regard to the enlargement of woman's sphere of work have been retrenched anew, viz., the employments in the telegraph and railroad offices. Those who were admitted formerly are retained until superannuated; for new applicants the difficulties are so enormous that they are tantamount to a denial. The State wants everything for its under-officers; women see that they are not wanted any longer, and accept it as meekly as only German women can accept a thing." The experiment of employing women as telegraph clerks, says the London *Pall Mall Gazette*, was begun 20 years ago in Finland. M. Tolstoy, at that time minister of posts and telegraphs, admitted them on trial for a term of three years, before the end of which their success was so evident that the experiment was extended in Russia. In 1874 it was fixed that there should not be more than 30 per cent. of women employed in post and telegraph offices, and to-day about 700 women earn their living by this employment. An agitation is now on foot for providing these female telegraphists with pensions, and steps are being taken which will insure for them a small sum after they have been employed for a certain number of years, or in case of sickness.

MR. GOULD PAYS THE DIVIDEND.—Injunctions are not always the preventives the law intends them to be. A rich man with a shrewd brain can usually circumvent the decisions of any court that ever existed on this restless planet. An injunction recently secured against the Western Union Company restrained it from paying dividends upon the entire amount of stock, including the $65,000,000 original issue, during the pendency of an existing suit. There was nothing, however, in the injunction to prevent Mr. Jay Gould from paying the dividends out of his own pocket, a work he began on the 17th, at the office of the Mercantile Trust Company, No. 120 Broadway, this city. The amount of dividends due the stockholders to June 30 is $1,400,000, or 1¾ per cent. upon the entire stock of $80.000,000. This amount Mr. Gould deposited with the Mercantile Trust Company, and each stockholder receives the amount of his dividend upon executing an assignment of his claim against the company to Mr. Gould when the money is paid. A rumor obtained in Wall street last week that some of the stockholders intended to obstruct the payment, but no interference was made. The work went on so happily that nearly one-half the dividend was paid in one day. The office of the Trust Company was crowded with applicants. Some inquisitive mortals are asking whether Mr. Gould is paying all this money out of his own pocket, or if there is not an arrangement between Mr. Gould and the company, by which the latter in reality is paying the money and running the risk. In the meantime the stockholders have been paid and the injunction is practically a dead letter.

## THE TELEPHONE.

PROGRESS IN OHIO.—Telephone communication has been established between Toledo and Fremont, Sandusky, Norwalk, Fostoria, Oberlin, and a dozen other towns between Toledo and Cleveland. Work has been commenced on a telephone line to connect Sandusky and Cleveland.

ELECTION.—The Central District and Printing Telegraph (telephone) Company, of Pittsburgh, last week elected the following directors: D. Lee Wilson, Ralph Bagaley, George I. Whitney, John L. George, C. O. Rowe, James Merrihen, Theo. N. Vail, George L. Phillips, Charles R. Truex.

DESTRUCTION CAUSED BY A TELEPHONE WIRE.—A useful and innocent telephone wire in the new department of the Indiana University at Bloomington was struck by lightning on the night of the 12th. The building was burned to the ground at a loss of $200,000. The museum contained two famous collections of fishes, and the library held 15,000 volumes.

A TELEPHONE FOR A SCENT.—A New York inventor who is experimenting with the telephone, with a view of transmitting smell, should be informed of the South Carolina farmer who is cultivating a new and exceedingly strong brand of onion. If he cares to call her up after dinner, the farmer's daughter might convey something which would be of importance to him.

THE TELEPHONE IN FREDERICK, MD.—The *Daily Times* of Frederick, Md., is jubilant over the establishment of a telephone exchange in that place. "It should not be forgotten in this connection," the *Times* adds, "that the credit of establishing this new and rapid means of communication belongs largely to Mr. E. L. Miller, whose push and energy have brought success out of an enterprise which at one time appeared to be hopelessly dead." Mr. George Warner and Miss Fannie Frazier have been appointed as assistants to Manager Miller. The Telephone Exchange Company is rapidly extending its lines throughout the country.

IN SOUTH AMERICA.—The Inter-Continental Telephone Company, of Boston, has received advices from its agent, Mr. James A. Derrom, in Caraccas, Venezuela, that within three weeks of his arrival in that capital he had taken 27 subscriptions for telephones, and that he has no doubt of very soon securing 100 subscribers there. In Laguayra, where an exchange is to be established, to be connected

with that in Caraccas, there are calls for 20 more instruments, and some 30 more, he says, will be required for connecting private lines. Seventy-five sets of instruments have been forwarded to Mr. Derrom. The company is considering propositions from persons holding concessions for Honduras and Guatemala to establish a sub-company in those States, and from another party to organize the business in other Central American districts.

MEXICAN TELEPHONE COMPANY.—The stockholders of this company, of whom there are 835, will shortly receive a circular saying:

"Notice is hereby given that it is the intention of the Mexican Telephone Company to increase the capital of said company to the sum of $2,000,000, and that a special meeting of the stockholders will be held at its office, No. 5 Beekman street, in the city of New York, on Tuesday, Aug. 14, 1883, at 12 o'clock noon, to provide for such increase and to take such action in the premises as may be necessary or expedient.

"F. E. C. BRYANT, Secretary."

Accompanying the above is a blank form of agreement, to be signed and returned with a proxy in case the stockholder is unable to attend in person the meeting. "It is very important," the officers say in another circular to be forwarded with the foregoing, "that you should sign the agreement and proxy at once, and send them to the secretary if you yourself cannot be present. It is necessary to receive the assent of the holders of $750.000 of the stock, and a failure so to do we consider might be vital to the interests of the company." The new stock cannot be issued under the laws of New York, in which State the company was incorporated, unless three-fourths of the stock assents. While the "intention" provides for doubling the capital, the present purpose is to issue no more than the 25,000 shares subscribed for by a syndicate. If, later, the extension of the works should require additional funds, more stock could be issued without going through the formality of obtaining the further assent of the stockholders.

MORE CONSOLIDATION.—The Telephone Exchange Company, which has hitherto operated the telephone exchanges in Baltimore and other cities and towns in the State of Maryland, was, on July 12, consolidated with the National Capital Telephone Company of Washington, the two forming the Chesapeake & Potomac Telephone Company. The new company has a perpetual license from the American Bell Telephone Company of Boston upon favorable terms. Its capital is $2,650,000, of which the Baltimore company represents about two-thirds. The property consists of the business and exchanges of the State of Maryland and of the District of Columbia. It begins business with over 6,000 telephones in use and a large area of undeveloped territory. For the development of this territory there is $100,000 cash in the treasury. The directors of the new company include Messrs. Wm. H. Forbes, president of the American Bell Telephone Company; A. G. Davis, president of the old Baltimore Company; A. B. Proal, of Baltimore; H. D. Cooke and H. S. Cummings, of the old Washington Company, and Morris F. Tyler and H. P. Frost, of New Haven, Conn., of the Southern New England Telephone Company. The officers are Messrs. Morris F. Tyler, president; A. G. Davis, vice-president; H. D. Cooke, treasurer, and Warren Choate, secretary. The new company takes immediate possession of the property and management. The Maryland Telephone Company was the first one organized in the State. It began with a capital of $50,000, There were but few subscribers when it started, and the receipts for the first month amounted to only $78. The company was in operation from 1879 to 1882, during which time its capital was increased to $200,000. In 1882 the name was changed to the Telephone Exchange Company, with a capital of $500,000.

## THE ELECTRIC LIGHT.

THE LATEST NOVELTY.—An electric light car has been built by the Cumberland Valley Railroad Company. It will be used to supply electric light to picnic grounds along the line of the road.

INCORPORATED.—The Electric Light and Power Company, of Mattoon, Ill., capital $10,000. Corporators—James F. Hughes, John W. Hanna, James H. Clark, Richard N. Brown and Eben E. Clark.

THE CHEAPEST LIGHT.—It is said that the cheapest electric light in the country is furnished to the people of Rochester, N. Y., where the charges are but forty cents per night for each lamp the year around. This is owing to the fact that water power is there utilized, at a cost that is merely nominal.

ELECTION.—The American Electric and Illuminating Company has elected the following officers: President and general manager, Edward H. Goff; first vice-president, Silas Gurney; second vice-president, William A. Hovey; treasurer, H. E. Irvine; secretary; Samuel Elder; general superintendent of construction, C. D. Smith.

DAMAGES ASKED FROM THE EDISON ELECTRIC LIGHT CO.—Suit has been brought in the Essex County, N. J., Circuit Court by George Strickle against the Edison Electric Light Company. The plaintiff sets forth that while in the employ of the company he became salivated with mercury to such an extent that he is unfitted for work and will remain an invalid all his life. He seeks $5,000 damages.

FALL OF AN ELECTRIC TOWER.—The electric tower at Fond du Lac, Wis., fell on the morning of the 16th. A piece weighing five hundred pounds crashed through the roof of a store, completely demolishing the store and damaging the building, but injuring nobody. The loss is $2 000. This is the second electric light tower that has lately fallen, and it is about time to devise means of preventing such an occurrence in the future.

ELECTRIC LIGHTS IN THE ROYAL COURTS OF JUSTICE.—The *London Times* reports a recent tour of inspection by the first commissioner of works and several friends of the various courts and the central hall of the royal courts of justice, for the purpose of inspecting the arrangements, which have now been completed, for lighting the building by the electric light. The central hall presented a very pretty appearance, being brilliantly illuminated by six Crompton arc lamps, each of 4.000-candle power, while the courts and corridors were lighted by Swan incandescent lamps. There are from 22 to 24 lamps in each of the 20 courts, and there are upward of 20,000 yards of conducting wires laid within the building.

LIGHTING THE HOLBORN VIADUCT BY ELECTRICITY.—The report of Colonel Haywood, engineer and surveyor to the London commission of sewers, upon the lighting of the Holborn viaduct by means of incandescent lamps—the first experiment of the kind—states that the illuminating power of the lamps is about 1¼ times that of the ordinary gas-lighting of the viaduct, and at the same cost. The observations extend over 12 months, during which the total number of failures, arising chiefly from defects in the machinery and defective carbons, was equal to about .03 per cent of the entire lighting. Colonel Haywood considers that unless arc lights be reduced in power, increased in number, and placed at less than the usual distances, they are not so good a mode of lighting public ways as either gas or the incandescent light.

AN ILLUMINATED SANCTUM.—*The National Republican* building, of Washington, D. C., is now lighted, from dusk to daybreak, by an electric light plant of 100 Maxim incandescent lamps. The paper thus expresses its riotous delight at the electrical apocalypse: *The Republican* glories in its absolute emancipation from the slavery endured while an enforced patron of the gas company. Language is inadequate to properly convey the sense of relief felt. It is like walking from darkness into daylight. The smoky-yellow glare of the villainous fluid which the gas company kindly permits to ooze through its kerosene-tar clogged pipes only exist in memory, as the recollection of a nightmare. The eye-destroying light produced by the so-called gas which the patrons of the gas company are compelled to use no longer vexes the editorial or the typographic eyes of *The Republican* force of workers. They labor through the long watches of the night in the full brilliancy of artificial sunlight, free from the oppressive heat of a hundred gas-jets, and exempt from the sewer odors that arise from every burner. A paradise reigns, compared to the old regime.

ELECTRIC LIGHTS AT SARATOGA.—A correspondent of the *Star*, of this city, writing from Saratoga, says: On the night of the 14th between 3,000 and 4,000 people witnessed the display of fireworks in Congress Park. The scene was one of beauty and animation. Every one who has been to Saratoga knows how picturesque is this little park, but when it is lighted up with Chinese lanterns and electric lights it becomes even more beautiful than ever. When to these are added the bright dresses of the ladies and the glitter and glare of fireworks the whole effect is one that would inspire Joaquin Miller to a sensuous poem or Walt Whitman to a barbaric yawp. To see the park to the best advantage on these occasions you should walk to the eastern side, just beyond the lake, where the reflection of the fireworks and Bengola lights shimmer in the water. You catch a glimpse of the lanterns through the foliage and indistinct visions of fluttering dresses and fair women, and as the strains from the orchestra float upon the summer night air it requires no very great stretch of the imagination to think yourself in fairy land with Oberon, Titania, Puck and the other pixies close at hand, with the solid pork merchants from the hotels representing Bottom and the other horny-fisted men of Athens.

A HEAVENLY RIVAL OF THE ELECTRIC LIGHT.—On the night of the 11th a meteor of extraordinary size astonished the people of Boston by passing across the northern sky, from west to east, at about fifteen minutes to 12 o'clock. The *Advertiser* says: It appeared at first considerably larger than one of the street electric lights, and its brightness was as intense. It moved with stately grandeur, apparently as if floating in an air current, so slow and steady was its progress. Its motion might well be compared with that of a large fire-balloon. As it passed along its course, its shape changed from a sphere to an elongated form, and it gradually diminished in size till it finally vanished from sight. There is a charm, and to some minds a superstitious interest, in the progress through the heavens of meteoric bodies. Scarcely a night in the year elapses without a number of these wanderers being visible to watchful eyes. The passage lower down in the atmosphere of a fragment of this kind has the effect of making it visible for a longer time than though it simply grazed the earth's envelope of air, and at the same time the greater density of the lower strata of air causes greater heat in the meteor, and more complete and speedy combustion. The altitude and size of Wednesday's meteor are shown by the fact that it was seen at points so widely distant from each other.

## MISCELLANEOUS NOTES.

ELECTRIC BELLS IN SLEEPING CARS.—Electric bells in every berth are a new and convenient feature of the Pullman sleeping cars.

A CABLE TO MARTHA'S VINEYARD.—The cable connecting Martha's Vineyard with the mainland was successfully laid on the 15th. Communication has been established.

AN ELECTRIC AIR CASTLE.—There is talk of establishing a school of electricity in this city. The plans so far are confined to the ideal and are on such a magnificent scale as air castles alone are built.

INCORPORATED.—At Springfield, Ill., on July 10, the Electric Transportation Company of Chicago, capital $10,000; incorporators, Frederick S. Winston, Jr., William N. Campbell, and Rockwell King.

ELECTRICITY AFTER CRUSTACEA.—A Brooklyn lawyer called a district-messenger boy, after long waiting in a chop-house, and ordered him to hunt up the waiter who was supposed to be on his way with soft-shell crabs. Electricity can make even crabs hurry.

AN ELECTRIC RAILROAD FOR CLEVELAND.—The Cleveland *Leader* says that a number of capitalists of that city, after hearing reports from representatives sent to the Chicago Railway Exposition and to the Edison electric railroad, have decided to form a company to establish and operate an electric railroad in Cleveland.

LIGHTNING INJURES A TELEGRAPH OFFICE.—During a thunder storm on the evening of the 13th at Washington, D. C., the cupola and switchboard of the Mutual Union office was struck by lightning and considerably damaged. The wires in and about the office were disabled. The insulated covering was set on fire in several places. The fire department was called out, but the fire was extinguished before the woodwork of the switchboard ignited.

AN INDUSTRIOUS THUNDERBOLT.—*Life* says that only one thunderbolt fell in Norwich, Conn., on the 21st, and yet it fired a barn, broke a dog's neck, scared a tin peddler into epilepsy, caused a dozen runaways, smashed four buggies and a coal cart, ripped up the fire alarm telegraph line, rang all the telephone bells in town, beat a drum, singed the tail of the minister's cat, broke up seven poker parties and one prayer meeting, and frightened an old maid's teeth out. Now who says electricity has no power?

PREPARING FOR THE ELECTRICAL EXHIBITION.—A committee of the board of managers of the Franklin Institute are making arrangements for the international exhibition of electricity to be opened September 3, on the Pennsylvania Railroad Company's property at Thirty-second and Market streets, Philadelphia. A special act of Congress, admitting foreign goods to the exhibition free of duty, was passed at the last session, and two members of the committee are about to visit the Electrical Exposition at Vienna for the purpose of inviting foreign exhibitors.

SUBMARINE CABLES.—A French paper gives some information about the submarine cables of the world. Nearly all the lines under the sea have been made by English workmen, bought with English money, and laid down by English engineers. The capital of the three companies reaching from London to the countries of the East represents more than 31,000 miles of submarine cables. The English companies own 13,000 miles, against 10,000 miles owned by others, of the cables between Europe and America. Not more than a tenth of the 12,000 miles of cable connecting Europe and Brazil with the West India Islands is owned outside of Great Britain.

A BABY ELECTRIC GUN.—The manufacture of small arms is a new field for electricity to operate in, and one inventors of electrical appliances are sanguine of success in. During a recent lecture in London before an assembly of army officers, inventors of small arms and other experts, Colonel Fosbery astonished his audience by suddenly drawing from under the table a weapon which he had just brought from Liége, and which he called a "baby electric gun." It could not be discharged until brought in connection with the source of electric force, but that done, it could be worked with amazing rapidity. its inventor, M. Pieper, of Liége, having a few days before fired 104 rounds in two minutes. Colonel Fosbery exhibited its mode of operation by means of a small electric accumulator secreted under his vest, and minute cartridges containing only powder and a wad. Many of Colonel Fosbery's listeners expressed the opinion that the manufacture of small arms would be again revolutionized.

STOCK QUOTATIONS.—Telegraph, telephone and electri light stocks were quoted on Wednesday of last week Wednesday of this week as follows:

| | July 11. | July 18. |
|---|---|---|
| American Cable | 68 | .... |
| Bay State Telephone | 133 | 120 |
| Bell Telephone | 276 | 270½ |
| Boston & Northern Telephone | 150 | 148 |
| Bell Telephone Co. of Missouri | 165 | .... |
| Brush Electric Light (Cleveland) | 100 | .... |
| Brush Illuminating Co., N. Y | 100 | .... |
| Consolidated Telephone Co | 2½ | .... |
| Central New York Telephone & Telegraph | 105 | .... |
| Continental | .... | 15 |
| Central Union Telegraph Company | 110 | .... |
| Edison Electric Light | 200 | 275 |
| Empire State Telephone & Telegraph Co | 200 | .... |
| Hudson River Telephone & Telegraph Co | 110 | 103 |
| Iowa Union Telephone Co | 102 | .... |
| Long Island & New Jersey Telephone Co | 114 | .... |
| Mexican Telephone Co | 2½ | 2 1/16 |
| Missouri & Kansas Telephone Co | 100 | .... |
| New Jersey & Long Island | .... | 104 |
| National Bell Telephone of Maine | .... | 70 |
| People's Telephone Co | 7½ | .... |
| Southwestern Telephone Co | 68 | .... |
| Suburban Telephone Co | 139 | .... |
| Southern Bell Telephone & Telegraph | 125 | 100 |
| Tropical Telephone | 2¼ | 2 |
| U. S. Electric Light | 128 | 128 |
| United Telephone Co., Kansas & Missouri | 97 | .... |
| Western Union Telegraph | 83½ | 80¼ |

## ELECTRICAL PATENTS ISSUED

*And Dated July* 10, 1883.

| | |
|---|---|
| Armature for dynamo-electric engines; Warren P. Freeman, New York, N. Y | 281,049 |
| Apparatus for measuring the amount of current energy received by a secondary battery; Charles F. Brush, Cleveland, Ohio | 281,176 |
| Automatic electric-circuit breaker; Lucius J. Phelps, New York, N. Y | 281,202 |
| Conduit for underground electric wires; Jas. Du Shane, South Bend, Indiana | 280,919 |
| Conduit for underground lines for telegraph and other wires; William Hendley, Washington, D. C | 281,064 |
| Current manipulator for secondary battery charging; Charles F. Brush, Cleveland, Ohio | 281,175 |
| Dynamo-electric machine; J. Edwin Giles, Hazleton, Pa | 281,052 |
| Electric underground cable; Frank A. Smith, Macomb, Ill | 280,869 |
| Electric fire-extinguisher and fire-alarm system; Charles F. Buell, New Haven, Conn | 280,906 |
| Electric carbon; Herman Frasch, Cleveland, Ohio | 281,048 |
| Electrical exercising apparatus; William T. McGinnis, New York, N. Y | 281,097 |
| Electrical conductor; Hiram D. Rogers, New York, N. Y | 281,223 |
| Electrically-heated mirror; Benjamin H. Goodsell, Charles Adamson and Carl O. Hering, Philadelphia, Pa | 281,224 |
| Galvanic battery; William W. Karschner, Washington, D. C | 280,933 |
| Insulator for electrical conductors; Percy C. Ohl, Plainfield, N. J | 280,947 |
| Process of treating alcoholic liquors with electricity; Anson C. Tichenor, Alameda, Cal | 280,882 |
| Printing telegraph; Stephen D. Field, New York, N. Y. | 281,182 |
| Quadruplex telegraph; Alexander Muirhead, London, England | 281,117 |
| Quadruplex telegraph; Alexander Muirhead and George K. Winter, London, England | 281,118 |
| Secondary battery or electric accumulator; Eli T. Starr, Philadelphia, Pa | 281,156 |
| Telephone receiver; Louis J. Crossley, Halifax, County of York, England | 280,800 |
| Tower for electric lights; Benjamin F. Orton, East Saginaw, Michigan | 280,850 |
| Telephone and telegraph protector; Charles C. Drake, Trenton, N. J | 280,916 |
| Telephone-call; Percy C. Ohl, Plainfield, N. J | 280,948 |
| Telephone-receiver; Joseph F. Batchelor, Baltimore, Md | 281,000 |
| Ventilating-conduits for electric wires and adjusting the wires in the same | 281,220 |

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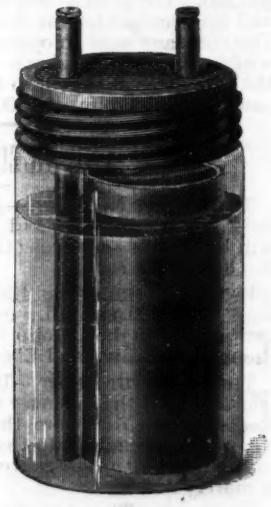

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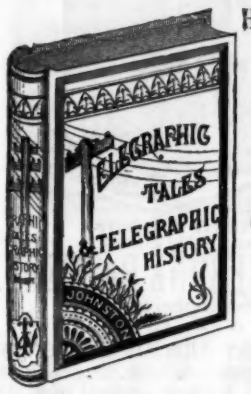


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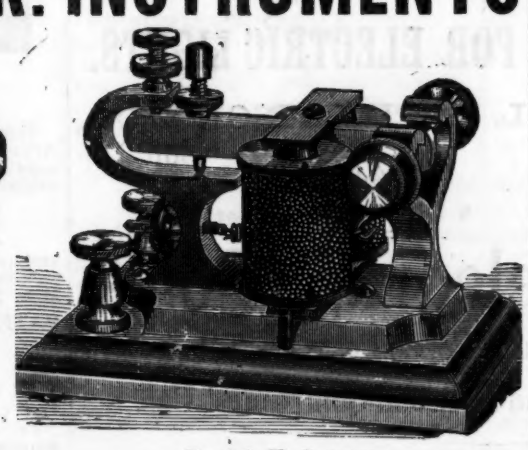

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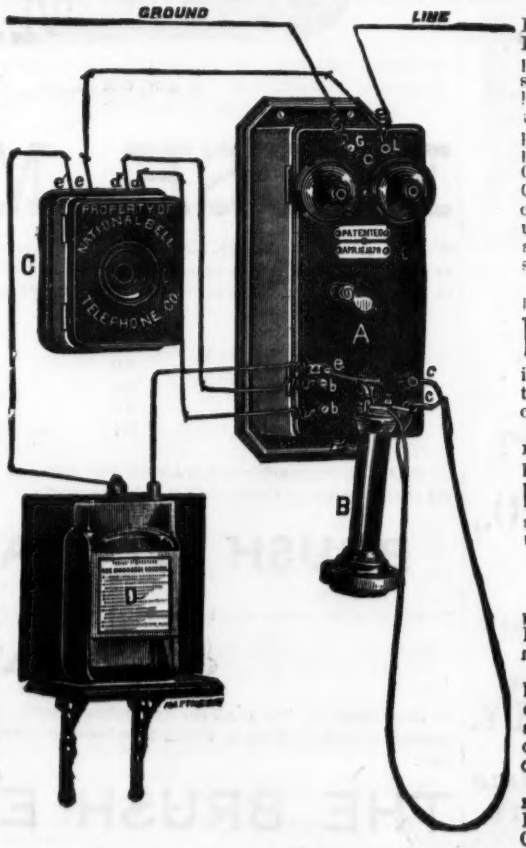


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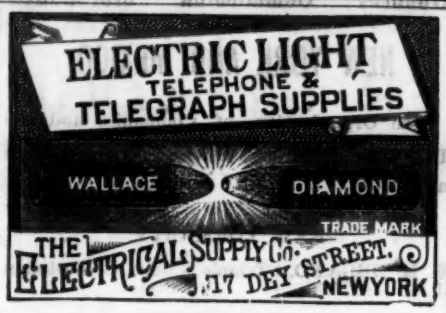


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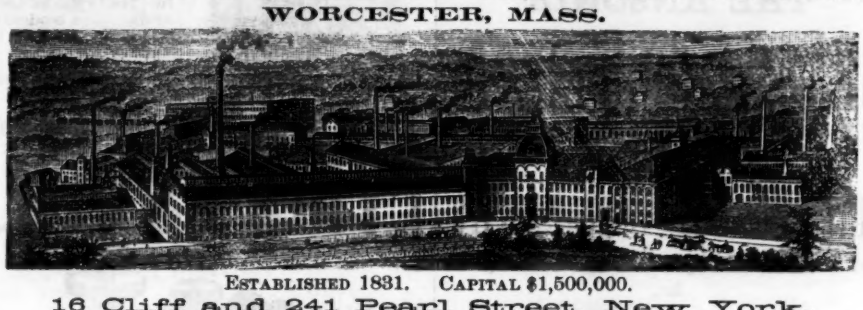

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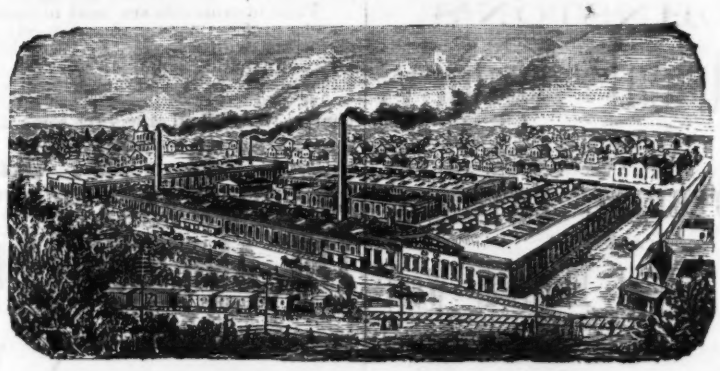

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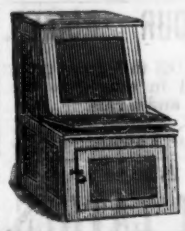

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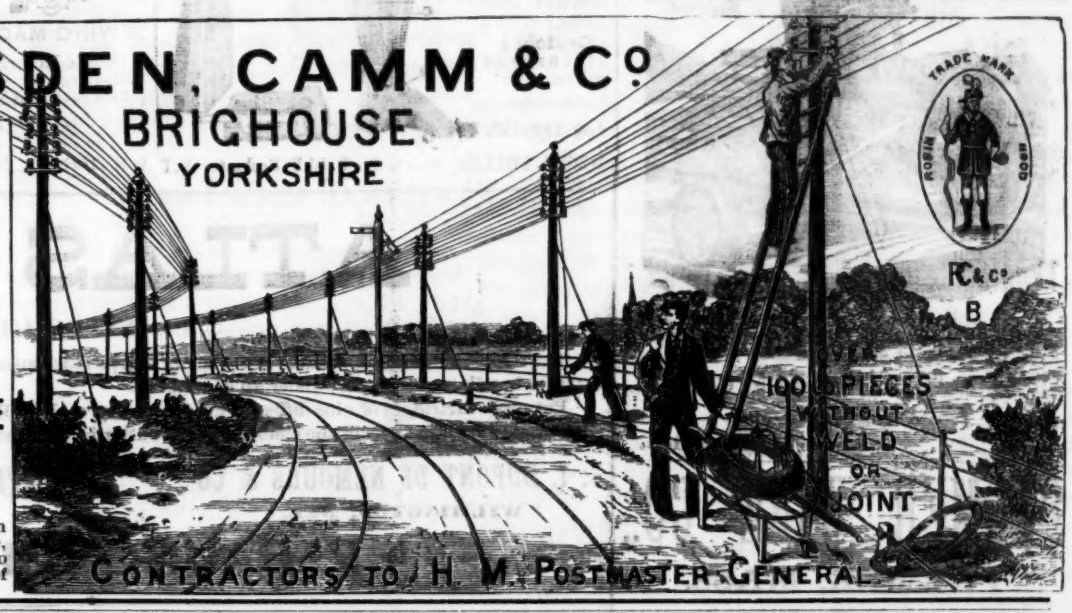


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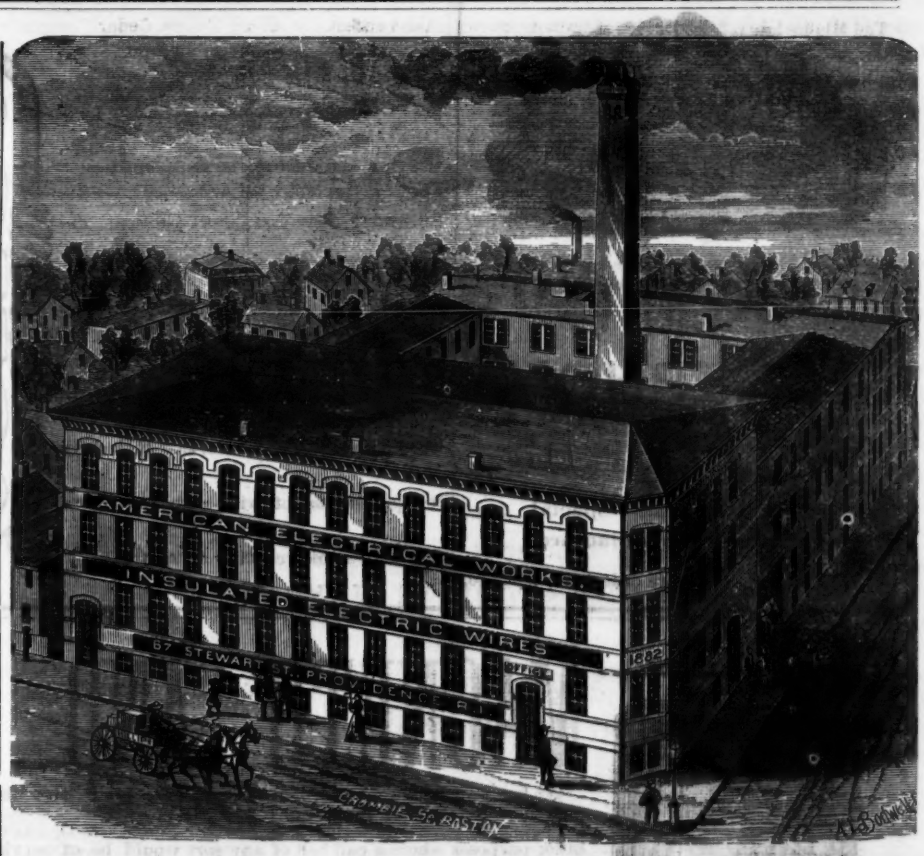


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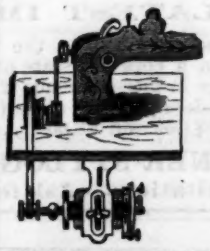

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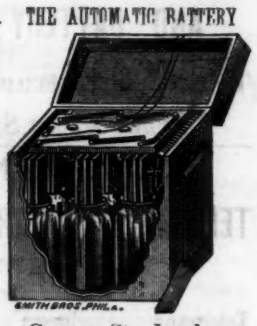


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